



PLANT BREEDING ABSTRACTS

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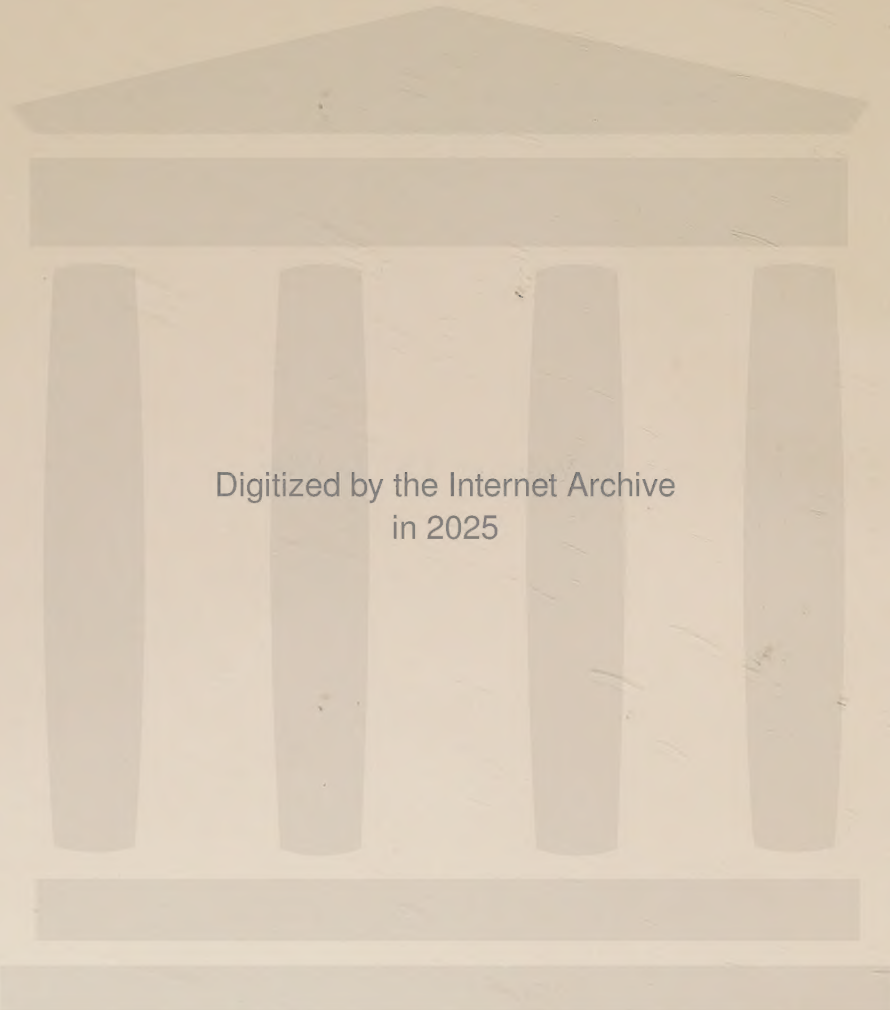
* General studies, see also individual crops.

PLANT BREEDING ABSTRACTS

*Prepared by the
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Plant Breeding Abstracts

Vol. XXVI, No. 1

C. A. B.

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FILE

*STATISTICS

- 1 GEIDEL, H.
Eine Möglichkeit der graphischen Ausführung des F- und t-Testes. (**A possible way of carrying out the F and t tests graphically**).
Z. Pflanzenz. 1955 : 34 : 325-28.

A trigonometrical method of performing the above tests is described.

- 2 ELANDT, R.
Metody syntezy statystycznej doświadczzeń jednopowtórzeniowych. (**Methods of statistical synthesis of single replication experiments**).
Roczn. Nauk rol. 1955 : 70 : Ser. A. : 443-62.

The methods of synthesizing the results of single replication experiments statistically are explained, the following aspects of the problem being considered: the principles underlying single replication experiments; investigation of homogeneity of variance by the application of Bartlett's test; the analysis of variance; and investigation of interaction by (a) the correlation method and (b) the method of deviation from the arithmetical mean.

The application of the method is exemplified by using the results, obtained in 1951, for the oil yields, from single replication experiments in 27 Polish localities, from a series of different oil plants.

- 3 SALMON, S. C.
Random versus systematic arrangements in non-Latin square field experiments.
Agron. J. 1955 : 47 : 289-94.

In the article summarized in *PBA*†, Vol. XXIV, Abst. 767, the author reexamined the relevant merits of systematic and random layouts. In the present paper, systematic and random arrangements are compared by superposing appropriate hypothetical designs on the yield data from 27 uniformity trials carried out in Canada and the USA and involving 14 different crops. The error variances in the systematic arrangements were found to be *ca.* 10% higher

than in the random layouts, but the treatment variances were appreciably lower (on the average 80.0% as against 97.7%). For investigators who are more interested in the precision of their mean values than in the accuracy of the error estimates, systematic arrangements would therefore be preferable to random arrangements. It is suggested that allowance for the greater error variance of systematic arrangements could be made by altering the significance levels for testing from 5% and 1% to 8% and 2%, respectively.

- 4 BEHRENS, W. U.
Der Durchschnitt der Prüfgliedmittewerte als Bezugsgrösse. (**The average of the treatment means as a measure of comparison**).

Z. Acker- u. PflBau. 1955 : 99 : 397-402.

Various formulae for the standard error of the average of the treatment means are discussed. The form appropriate for the analysis of variance is $\frac{v-1}{n.v}$ where *s* is the standard deviation of the plot yields, *n* the number of plots per treatment, and *v* the number of treatments.

- 5 FISCHBECK, G.
Ein Beitrag zur Anlage und Auswertung von Feldversuchen. (**A contribution to the lay-out and evaluation of field experiments**).
Z. Pflanzenz. 1955 : 34 : 197-205.

In continuation of the model experiment of H. Rundfeldt (cf. *PBA*, Vol. XXIV, Abst. 769) the author analyses a model comparing systematic arrangement of the plots, and two random arrangements laid out (1) in the direction of maximum soil heterogeneity and (2) in the direction of minimum soil heterogeneity. Six blocks and five "varieties" were used. The random arrangements showed no definite superiority to the systematic arrangement in respect of compensating for soil differences. The effect of soil differences was, however, less in the layout in the direction of maximum soil heterogeneity.

* General studies, see also individual crops.

† *Plant Breeding Abstracts*.

- 6 ATANASIU, N.
Stellungnahme zu den "Bemerkungen zu der Arbeit von N. Atanasiu: Zur Frage der Anlage und Auswertung der Feldversuche" von A. Mudra. (**Comments on A. Mudra's paper entitled "Observations on N. Atanasiu's article: On the question of the layout and evaluation of field experiments"**).

Z. Pflanzenz. 1955 : 34 : 206-08.

The author replies to criticisms of an earlier paper of his made by A. Mudra (cf. *PBA*, Vol. XXV, Absts. 638 and 1526) and reiterates that analysis of variance is not sufficient for dealing with all the problems arising from soil heterogeneity in field trials.

- 7 MITSCHERLICH, E. A.
Grundlegendes zur Ausschaltung der Ungleichartigkeit des Bodens bei Feldversuchen. (**Basic considerations for eliminating soil heterogeneity in field trials**).

Z. Pflanzenz. 1955 : 34 : 209-12.

In reply to Mudra's criticisms of Atanasiu (cf. *PBA*, Vol. XXV, Absts. 638 and 1526 and Vol. XXVI, Abst. 6), the author points out that soil heterogeneity is distributed systematically and cannot be treated as a random distribution. Possible ways of allowing for soil heterogeneity in field trials are briefly discussed.

- 8 BLAIM, K.
Metodyka pobierania średnich próbek dla potrzeb doświadczalnictwa rolniczego. (**The technique of collecting average samples as required for agricultural experimentation**).

Roczn. Nauk rol. 1955 : 70 : Ser. A : 463-78.

Precise descriptions are given of the methods for obtaining true average samples, for analysis, of the following plant materials: seeds of cereals, legumes and oil-bearing plants; vegetables; fruits; berries; fodder plants; and plants yielding resin, rubber and tannins.

*GENETICS

MONTALENTI, G. & CHIARUGI, A.
(Editors).

Atti del IX Congresso Internazionale di Genetica, Bellagio (Como), 24-31 Agosto 1953. Parte I. [**Proceedings of the 9th International Congress of Genetics, Bellagio (Como), 24-31 August 1953. Part I**].

Caryologia 1954 : 6 : Suppl. : Pp. 619 + ix.

The following contributions are of most interest to plant breeders and geneticists:—

- 9 Goldschmidt, R. B. *Different philosophies of genetics*. Presidential address. (pp. 83-99).

In this address, already summarized in *PBA*, Vol. XXIV, Abst. 2596, contrasts are drawn between two alternative approaches in genetical research, viz. the statistical or static point of view and the physiological or dynamic point of view.

- 10 Lewis, E. B. *Pseudoallelism and the gene concept*. (pp. 100-05).

Experiments on *Drosophila* have demonstrated that the phenotypic criterion of allelism is invalid when pseudoalleles with a position effect are under consideration and have suggested that the individual components of a pseudoallelic series are distinguishable not only by means of crossing-over but are also functionally distinct.

- 11 Mather, K. *The genetical units of continuous variation*. (pp. 106-23).

Similarities and differences between the action of major genes and the members of polygenic systems are examined and differences between major genic and polygenic action are discussed in terms of their physical genetic basis. Arguments are put forward in support of the hypothesis of polygenic control of continuous variation in preference to the isoallelic interpretation.

- 12 Lerner, I. M. *The genotype in Mendelian populations*. (pp. 124-38).

The author expounds his hypothesis of genetic homeostasis (cf. *PBA*, Vol. XXV, p. 102).

- 13 Dunn, L. C. *The study of complex loci*. (pp. 155-66).

Two categories of alleles which do not conform to the classical concept of multiple alleles are distinguished, firstly, pseudoalleles, semialleles or paraalleles, and secondly, alleles at a complex locus. The author describes the behaviour of the \pm alleles in the mouse as an example of the latter type. The most outstanding feature of complex loci and of paraloci is the relatedness of the functions affected by neighbouring mutations. It is suggested that such loci are developed because certain key processes are best carried out when the initiating materials themselves are closely integrated spatially.

- 14 Dulbecco, R. *Recent developments in virus genetics*. (pp. 182-91).

Investigations on mutation in bacteriophages and on genetic recombination in bacteriophages

* General studies, see also individual crops.

and in influenza viruses have shown that the genetics of viruses is basically similar to that of higher organisms. Emphasis is laid on the importance of this general conclusion in view of recent discoveries concerning the function and structure of the chemical components of virus particles and also the structure of nucleic acids.

- 15 Pontecorvo, G. *Mitotic recombination in the genetic systems of filamentous fungi.* (pp. 192-200).

The author reviews work on mitotic recombination in *Aspergillus* spp. and *Penicillium chrysogenum* at the Department of Genetics, Glasgow University, and discusses the significance of mitotic recombination in phytopathology, the production of improved strains for industrial fermentation and assessing the genetical role of heterocaryosis (cf. *PBA*, Vol. XXIV, Abst. 1664 and Vol. XXV, Abst. 90).

- 16 Demerec, M. *Genetic action of mutagens.* (pp. 201-17).

A summary is presented of the main results of investigations conducted during the past ten years on induced mutation in *Escherichia coli* at the Department of Genetics, Carnegie Institution of Washington. The characters studied comprise nutritional deficiencies and reactions to phage and to streptomycin. Four phenomena are discussed in particular: mutagen stability, delayed appearance of induced mutants, mutagen specificity and modification of mutagenic effectiveness by various means (cf. *PBA*, Vol. XXV, Abst. 1600). Induced and spontaneous mutation are believed to arise through aberrations in metabolism.

- 17 Stubbe, H. *Über mutable Gene bei Antirrhinum majus.* (On mutable genes in *A. majus*). (pp. 218-26).

A fuller version of this article has been summarized in *PBA*, Vol. XXV, Abst. 1544.

- 18 Fisher, R. A. *The experimental study of multiple crossing over.* (pp. 227-31).

The following points were discussed: (1) if l = the number of loci, the number of parameters required to specify the modes of gamete formation is $2-l^{l-1}-1$, while the number of gene pairs is $\frac{1}{2}l(l-1)$; these two expressions are equal for $l = 3$, but not for $l > 3$. (2) For 3 factors, the efficiency of tests with the triple heterozygote is immensely greater than testing each pair of 2 factors. (3) If y_1, y_2 are the recombination fractions over 2 segments, and y_{1+2} , the recombination fraction over their sum, and the number of double cross-overs is $2Ky_1y_2y_{1+2}$, then K will approximate to 1 whenever Kosambi's

formula holds. (4) The use of coupling and repulsion data in making allowance for differential viabilities is considered.

- 19 Waddington, C. H. *The integration of gene-controlled processes and its bearing on evolution.* (pp. 232-45).

Experiments on *Drosophila* have indicated that a long-established acquired character, favoured by selection, may become genetically assimilated (cf. *PBA*, Vol. XXIV, Abst. 784). In the author's view, development is brought about by a complex of interacting processes integrated in such a manner that the system can be more easily changed in certain ways than in others. Natural selection for the ability to respond adaptively to environmental stresses determines the kind of modification to which the system is liable. Genic changes, which in chemical terms may be considered to be random, have genotypic effects which are not random but dependent upon the lability or stability incorporated in the developmental system. It is suggested that such an hypothesis synthesizes on the one hand the modern interpretation of Darwinism, which assigns the origin of novelty to a random process of mutation unrelated to the selection to which it is submitted, and the finalist or teleological view which supposes that the environment is directly involved in the origin of the evolutionary novelties upon which it acts.

- 20 Câmara, A. *Advances in the centromere's problem.* (pp. 254-71).

A review is given of recent research on the structure of the centromere, the role of centromeric regions in dicentrics and on chromosomes with nonlocalized centromeres. The structure of the centromere has now been established as chromomeric. Since, unlike acentric fragments, fragments derived from chromosomes with diffuse centromeres may survive, polyploids may arise from polycentric diploids by chromosome breakage. Within each species with non-localized centromeres the chromosomes show a marked constancy in dimensions; it is suggested that in the absence of localized centromeres equality in dimensions is essential in view of the mechanics of chromosome behaviour during division. When the chromosomes are of different length, as in aneuploids or hybrids of *Luzula*, structural rearrangement may be expected to occur until equality in length is attained; it has in fact been observed that the more similar in length the chromosomes the lower the frequency of bridges. It is further suggested that centromeres may arise *de novo* as mutations and conversely that centromeric

activity may be suppressed as the result of mutation.

21 Oksala, T. *Timing relationships in mitosis and meiosis.* (pp. 272-81).

Mitosis and meiosis are considered in terms of two cyclical processes, viz. the successive reproduction and division of the chromosomes and the alternation of a polarized and a non-polarized condition of the nucleus. In normal mitosis, one cycle of polarity is coordinated with chromosome development. Even in normal mitosis chromonema reproduction shows no definite relationship with chromosome reproduction and the cycle of polarity. It is accordingly suggested that a chromosome may be regarded as double, irrespective of the number of the chromonemata, by its readiness to divide into two functional subunits. Various disturbances in the relationship between polarity and chromosome development give rise to modifications such as endomitosis, the *Spinacia* type of polysomaty or nuclear restitution. Meiosis is characterized by precocity in polarity as the result, it is suggested, of a gradual increase in precocity during premeiotic mitoses until eventually a situation obtains in which polarity sets in before doubling. The period of meiosis I and II normally consists of one reproductive cycle of the chromosome and three cycles of polarity. It is postulated that the polarized condition prevailing at zygotene is responsible for primary pairing.

22 Müntzing, A. *Cyto-genetics of accessory chromosomes (B-chromosomes).* (pp. 282-301).

The author reports the results obtained since his contribution to the previous congress from investigations on B chromosomes at Lund University, Sweden (cf. *PBA*, Vol. XIX, Abst. 2375).

In rye, plants with B chromosomes are in general more frequent in primitive and less intensively selected strains from Asia than in European material. Nondisjunction regularly leads to a marked increase in the number of B chromosomes, differences among strains with respect to the increase being due to disparities in frequencies of pairing and meiotic elimination. Numerical increase is negatively correlated with the number of generations of inbreeding. B chromosomes, particularly if 6 or more are present, are associated with a deleterious effect upon fertility and vigour. B chromosomes without the terminal half of the long arm lack the ability to undergo nondisjunction. The standard B chromosomes of Östgöta gråråg

[Östgöta Grey rye] and Wasa II show only slight differences in size and structure at pachytene and were therefore probably both derived from the ancestral type of B chromosome observed in Asiatic ryes.

In *Festuca pratensis*, B chromosomes are seldom eliminated during meiosis and nondisjunction is restricted to the pollen grains; plants with B chromosomes are reduced in weight and pollen fertility, especially when the number of such chromosomes is high (cf. *PBA*, Vol. XXV, Absts. 1132-3). The frequency of plants with B chromosomes varies significantly according to geographical origin, being much lower in England than Sweden. In Sweden the frequency is higher in plants growing on clay soil than on sandy soil. In *Anthoxanthum aristatum* also, nondisjunction regularly occurs in the pollen.

In *Centaurea scabiosa*, some meiotic elimination of B chromosomes occurs but the loss is not counterbalanced by nondisjunction. The presence of a few B chromosomes appears to have a more favourable effect, as shown by data on plant weight, than total absence of such chromosomes; a high number has however a deleterious influence. In the absence of any mechanism for their numerical increase, B chromosomes therefore appear to possess some positive selective value. Geographical variation in frequencies of B chromosomes has been noted. In a particular sexual $2n$ strain of *Poa alpina*, 2-8 B chromosomes are present in all individuals although they are eliminated in most of the somatic tissues. Some meiotic elimination occurs but no nondisjunction.

23 Sonneborn, T. M. *Patterns of nucleocytoplasmic integration in Paramecium* (pp. 307-25).

The differentiation of nuclei into micronuclei and macronuclei depends upon the nature of the cytoplasm, although evidence has been obtained that the decisive cytoplasmic condition may be autonomous. Investigations on control of mating type have revealed that the macronucleus of one sexual generation influences the cytoplasm in such a way that it will be of the kind which will determine the production of the same type of macronucleus in the next sexual generation; in this case of nucleocytoplasmic integration the cytoplasmic component shows no autonomy. In cyclic systems such as these two types, both components are in a sense mutable, since a change in either the nuclear or cytoplasmic component is perpetuated by the other. It is suggested that for the interpretation of such nucleocytoplasmic systems the usual concepts of mutation, self duplication,

genetic material and genetic system require to be broadened.

24 *Darlington, C. D. Heredity and environment. (pp. 370-81).*

The element of uncertainty, derived from the dissimilarity between parents and offspring as the result of sexual recombination has, it is suggested, led to an underestimation of the significance of genetic determination as applied to the individual organism as a whole. The term heredity should imply a synthesis of hereditary uncertainty and genetic determinism. Underestimation of the role of genetic determination has often led to a misunderstanding of the reaction between heredity and the environment. Furthermore, in certain circumstances, as in the case of cytoplasmic and embryological sources of discordance between one-egg twins in man, the distinction between the effects of heredity and the environment and between heredity and development may not be possible; concepts such as heredity and environment cannot therefore be treated as axiomatic.

25 *Dobzhansky, T. Evolution as a creative process. (pp. 435-49).*

Biological concepts spring from two fundamental and opposed habits of thinking, viz. the preformistic and epigenetic attitudes. According to the author, neo-Darwinism furnishes a basis for a scientifically and philosophically satisfactory synthesis of preformation and epigenesis. He lays emphasis on the experimental interest of "mesoevolutionary" changes of an intermediate magnitude. In experimental populations of *Drosophila* containing different gene arrangements but of the same geographical origin, not the genotypes themselves but only the relative frequencies of gene complexes coadapted for the production of superior fitness in heterozygotes become altered; changes in such populations are thus microevolutionary. Alterations in populations of geographically mixed origin are however mesoevolutionary; in some populations no equilibria are established since no heterotic heterozygotes are produced, one of two competing chromosomal types tending to reach fixation, with the elimination of the other. In the author's view, evolution is deterministic or preformistic on the microevolutionary level, being attributable to relatively simple and immediate physiological causes, in turn related to the genotypic constitution. At the mesoevolutionary and macroevolutionary levels, however, the historical order of accumulation of genetic changes

assumes increasing importance and the genotype becomes more and more the product of adaptive integration and in this sense these levels of evolution may be regarded as epigenetic or creative.

26 *Buzzati-Traverso, A. A. On the role of mutation rate in evolution. (pp. 450-62).*

The view is expressed that geneticists tend to consider the evolutionary value of a particular mutation on too narrow and anthropomorphic a basis, irrespective of the environmental factors concerned and the complexity of the genotype. Experiments carried out by the author and his colleagues on *Drosophila* have shown that a mutagenic agent such as X rays can increase the range of variability in polygenic systems both in a plus and minus direction with respect to fitness for a given environment and that through natural selection favourable mutations accumulate in the course of a few generations, both physiological and morphological changes being involved in the increased degree of adaptation. The type of genetic variability induced appears to be the same as that arising spontaneously, but at a much lower rate, in control populations. X irradiation may also produce variability which results in a renewed response to artificial selection in the case of a character which had been selected for many generations and had reached a plateau with respect to its average value. It is suggested that description of mutants in terms of conspicuousness at the morphological level should be abandoned. The evidence that under experimental conditions an increase in mutation rate may lead to an acceleration of the rate of adaptation may point to mutation rate as a determinant in evolution under actual conditions.

27 *Clausen, J. Partial apomixis as an equilibrium system in evolution. (pp. 469-79).*

Mainly on the basis of data on *Poa*, partial apomixis is regarded as a means of maintaining potential variability which under certain conditions can be released by interspecific and intraspecific hybridization. In the progenies of crosses between partial apomicts the normal equilibrium between apomictic and sexual reproduction is disturbed, establishment of balance between the two processes under the influence of natural selection depending on the relative proportions, fertility and vigour of the sexual and apomictic progeny. Equilibrium between apomixis and sexuality is apparently maintained through a time differential in the development of the embryos resulting from the two processes.

- 28 Haldane, J. B. S. *The measurement of natural selection.* (pp. 480-87).

The intensity of natural selection (I) is defined as $I = \log_e S_0 - \log_e S$, where S_0 represents the fitness of the optimum phenotype and S the fitness of the whole population. I can sometimes be inferred from the distribution of a particular character among an original population and among the survivors. I ranges from ca. 0 to 12%. In all cases, natural selection reduces variance by eliminating extreme forms.

- 29 Chiarugi, A. *La poliploidia somatica nelle piante.* (Somatic polyploidy in plants). (pp. 488-520).

A general review of the occurrence and significance of endopolyploidy, polyteny and polysomaty in plants is given.

- 30 Frankel, O. H. *Invasion and evolution of plants in Australia and New Zealand.* (pp. 600-19).

It is pointed out that study of evolutionary changes undergone by cultivated plants when introduced to new habitats is a promising and as yet hardly explored field for the evolutionary geneticist. After discussing in general the environmental and genetic processes likely to be involved in the adaptation of introductions, the author analyses the evolutionary record of a number of crops cultivated in Australia and New Zealand, showing differences in manner of introduction, breeding system, and degree of deliberate selection after introduction. Perennial ryegrass and maize have displayed rapid and specific selective responses to different environments, resulting in ecological adaptation and genetic stabilization; in the case of maize, mass selection has hastened adaptation. Wimmera ryegrass (*Lolium rigidum*) has retained, and perhaps increased, its adaptive polymorphism. Subterranean clover, although a biologically conservative species, shows ecotype differentiation which is solely or mainly the expression of the variation among the original introductions. In the case of wheat, adaptation was achieved only after a long and complex process of recombination of genes derived from diverse sources, breeding having been based upon a fairly small number of highly adapted primary parents. *Phalaris tuberosa*, introduced as one small sample, has undergone little adaptive change.

- 31 STEBBINS, G. L.

Ernest Brown Babcock, 1877-1954.

Madroño, S. Francisco 1955 : 13 : 81-83.

This obituary notice briefly reviews the late Professor Babcock's contributions to the genetic elucidation of the genus *Crepis* and to plant breeding in general.

- 32 MENEZES, O. B. DE

Genética e ecologia agrícola. (**Genetics and agricultural ecology**).

Rev. Agric., S. Paulo 1955 : 30 : 71-74.

The author maintains that G. Azzi, in his concept of agricultural ecology (cf. *PBA*, Vol. XXIII, Abst. 1873), overestimates the role of environment, in much the same way as the Lysenko school in Russia does. The results of the first survey organized under the auspices of Azzi in Brazil have, it is pointed out, been nil.

- 33 MICHIE, D.

'Affinity.'

Proc. roy. Soc. 1955 : Ser. B : 144 : 241-59.

Data, principally derived from mouse genetics, which point to the operation of "affinity," the tendency of centromeres of similar parentage to remain together during meiotic segregation, are analysed. Two types of affinity are postulated: (1) mutual affinity, in which the centromeres attract one another; and (2) polar affinity, in which some extrinsic orientating force is responsible. Statistical procedures for detecting affinity and for distinguishing between the two categories are exemplified. It is thought that the emergence of affinity may be favoured by natural selection since it assists in the maintenance of favourable gene combinations distributed over several chromosomes (cf. *PBA*, Vol. XXIV, Absts. 11-12).

- 34 JINKS, J. L. & MATHER, K.

Stability in development of heterozygotes and homozygotes.

Proc. roy. Soc. 1955 : 143 : 561-78.

In outbred organisms, the heterozygotes tend to show less internal variation than the homozygotes. The authors therefore compared the variation of genetically homogeneous plots of inbred lines and F_1 hybrids of the inbreeding species *Nicotiana rustica*. The inbreds and the hybrids hardly differed in respect of variability in leaf length and capsule number; with regard to height, the hybrids were more variable than the inbreds. These findings lend support to the view that the greater developmental stability of the heterozygotes of outbreeding organisms is a result of natural selection acting on the outbreeding population and is not a direct physiological effect of heterozygosis.

MATHER, K.

A discussion on hybrid vigour.

Proc. roy. Soc. 1955 : Ser. B : 144 : 143-221.

The following papers are of significance for plant breeding:—

- 35 Mather, K. *The genetical basis of heterosis*. (pp. 143-50).

A general discussion of the genetical significance of heterosis is presented, special attention being given to the theory that heterosis results from heterozygosis *per se*, overdominance, the effects of heterosis or its absence on chromosome behaviour, mating systems, and genic balance.

- 36 Rees, H. *Heterosis in chromosome behaviour*. (pp. 150-59).

Inbreeding depression expressed by increased frequency of chromosome breakage, splitting errors, premeiotic errors, neocentric activity, P bivalents and uncoiling was noted in the pollen mother cells of rye lines inbred for over 26 years. In F_1 hybrids between the lines, the frequencies of these aberrations were appreciably lower.

- 37 Smith, J. M., Clarke, J. M. & Hollingsworth, M. J. *The expression of hybrid vigor in Drosophila subobscura*. (pp. 159-71).

Evidence that inbred lines are more variable in respect of fertility and eclosion time than hybrid populations derived from them is presented.

- 38 Pontecorvo, G. *Gene structure and action in relation to heterosis*. (pp. 171-77).

A discussion of position pseudoallelism, which the author prefers to denote as the Lewis effect, and complex loci is presented, examples being taken principally from *Aspergillus*. Recently, chromosome regions less than 1 cM. in length have been detected in *Aspergillus* in which some mutants display the Lewis effect, some exhibit complementarity as in complex loci, while others appear to behave in an intermediate fashion.

- 39 Lewis, D. *Gene interaction, environment and hybrid vigour*. (pp. 178-85).

Experiments on the effect of controlled environmental conditions on inbred lines of *Lycopersicon esculentum* 'Ailsa Craig' and *L. pimpinellifolium* and on the direct and reciprocal hybrids between them are reported. The environmental conditions applied were temperatures of 14-15° and 18-19° C. and artificial light of 100, 200, 400 or 600 ft.-candles for 10 hr. per day. In general, the hybrids were able to adapt themselves to a wider range of conditions than the inbred parents. Reciprocal differences between the hybrids were evident under some conditions. It is suggested that the greater phenotypic stability of hybrids and heterosis itself may be the result of the higher biochemical versatility of hybrids.

- 40 Dodds, K. S. *Hybrid vigour in plant breeding*. (pp. 185-92).

The significance of heterosis for crop improvement is discussed, special attention being given to the use of male sterility for hybrid production, synthetic varieties, genetic homeostasis and the potentialities of breeding for hybrid vigour as compared with other breeding methods.

- 41 Darlington, C. D. *Heterosis from the point of view of the chromosome*. (pp. 213-15).

It is pointed out that the distinction between allelic and nonallelic balance is a matter of degree, as is shown by the occurrence of gene duplication. A human pedigree supporting the notion of fertility as an indicator of heterosis is tabulated.

- 42 Huxley, J. S. *Heterosis and morphism*. (pp. 215-17).

Balanced morphism is determined by either a chromosomal, chromosomegmental or genic system. Chromosomegmental morphism characteristically involves euheterosis while genic morphism is based on what is termed the "double-dose disadvantage" of the homozygous condition.

- 43 Haldane, J. B. S. *On the biochemistry of heterosis, and the stabilization of polymorphism*. (pp. 217-20).

Attention is drawn to the possibility that heterosis may be one of the effects of the production of "hybrid molecules," i.e. substances produced by the heterozygote but by neither of the homozygotes. The formation of hybrid molecules has been demonstrated by Wurmser *et al.* in the case of human blood-group agglutinins.

With regard to polymorphism, mention is made of various stabilizing systems based on the operation of natural selection in contrast to systems stabilized by heterosis.

- 44 Haskell, G. *Heterosis in seedling plants*. (p. 221).

It is suggested that one of the functions of heterosis in the wild state is to promote seedling vigour and thus aid establishment.

- 45 KISTNER, G.
Über plastidenbedingtes Absterben während der Embryoentwicklung einiger Oenotherenbastarde. (Death during the development of the embryos caused by plastids in certain *Oenothera* hybrids).
Z. indukt. Abstamm.- u. VererbLehre 1955 : 86 : 521-44.

In a number of crosses between *Oe. hookeri* and

species belonging to the *Raimannia* group mostly empty seeds occurred when *Oe. hookeri* was used as seed parent. Detailed investigation showed that the effect was due to a failure of the *hookeri* plastids to develop in cells containing a hybrid nucleus, resulting in failure of the hybrid embryos to develop. In certain other crosses where plastids were transmitted from the pollen parent through the pollen tube, viable embryos and seeds were obtained.

VARIATIONS, MODIFICATIONS, MUTATIONS

- 46 HORNER, T. W. & KEMPTHORNE, O.
The components of variance and the correlations between relatives in symmetrical random mating populations.

Genetics 1955 : 40 : 310-20.

The results obtained by O. Kempthorne for the correlation values between relatives in random-mating populations (cf. *PBA*, Vol. XXV, Abst. 2639) are applied to the case of a random-mating population in which the genotypic value is symmetrical with respect to the components of genotypic variance, gene frequency is $\frac{1}{2}$ for each locus, and there is no linkage. Components of genotypic variance were calculated for the following gene models: complementary, duplicate factor, multiplicative and optimum number. The results are of special interest for estimating the importance of epistasis in a breeding programme.

- 47 SPENCER, J. L. & BLAKESLEE, A. F.
Induced pollen lethals from seeds of *Datura stramonium* exposed to different radiations.
Proc. nat. Acad. Sci. Wash. 1955 : 41 : 307-12.

On the basis of mutation rates as indicated by data on pollen abortion, the biological efficiency of fast neutrons from a nuclear detonation and of an equivalent dose of fast neutrons from a cyclotron proved to be approximately 13 or 14 times that of X rays. Both X rays and fast neutrons induced chromosomal and genic lethal changes in a ratio of ca. 4:1 but thermal-neutron exposure resulted in the production of the two types of abortion in a 3:2 ratio. The data on the effects of thermal neutrons were not sufficient to permit any conclusion concerning the relative effectiveness of this radiation.

- 48 HESS, H.
Probleme der Artbildung. (Problems of species formation).

Schweiz. landw. Mh. 1955 : 33 : 253-61.

The text of an inaugural address presented at the Federal Technical University, Zürich, in February 1955 is given. After a preliminary account of the role of the gene and ways in which mutations may occur under natural conditions or be induced experimentally, the author goes on to discuss the effects of mutations, interspecific hybridization, naturally-occurring polyploidization and geographical isolation on the formation of new species.

*CYTOLOGY

- 49 **Congress of Cell Biology.**
Nature, Lond. 1955 : 176 : p. 105.

A short account of the eighth International Congress for Cell Biology is presented (cf. *PBA*, Vol. XXV, Abst. 1551).

- 50 STUBBE, H.
Einige neuere Probleme der Genetik. (Some recent problems in genetics).
Wiss. Z. Martin-Luther-Univ. Halle-Wittenberg 1954/55 : 4 : 173-83.

The nature of the chromosome is discussed with reference to the occurrence of mutations. After criticizing the classical theory of the gene the author puts forward the hypothesis that it is the chromosome and not the gene that is the genetical and chemical unit of heredity, hereditary changes being interpreted as the result of rearrangements of varying magnitude in the architecture of the chromosome. Advances in the study of cytoplasmic inheritance are then dealt with, reference being made to work on *Drosophila* sp., *Mirabilis jalapa* and *Epilobium* sp. (cf. *PBA*, Vol. XXIV, Absts. 782 and 1563). In conclusion, the question of the possible inheritance of liability to cancer is discussed, together with the theory that cancerous cells may arise as the result of mutation.

- 51 KOOPMANS, A.
Chromosoomonderzoek na 1935. (Research on chromosomes since 1935).

Vakbl. Biol. 1955 : 35 : 121-31.

A general survey of research since 1935 on the nature and function of chromosomes (cf. *PBA*, Vol. XXV, Abst. 2662) is presented. Among the subjects touched upon briefly are chromosome numbers of plants and animals, the

* General studies, see also individual crops.

occurrence of natural polyploidy, the role played by polyploidy in evolution, the significance of differences in the geographical distribution of polyploids and diploids, the induction of polyploidy by colchicine treatment, the action of toxic substances upon mitosis, and the commercial value of certain tetraploid plants such as tetraploid rye.

52 OINUMA, T.

(On the shift in studies of the caryotype and on the "microcaryotype").

Senshokutai (Chromosome)/Kromosomo 1953 : Nos. 17-19 : 643-50. [Japanese].

A review of work on caryotype analysis is presented, and increased attention to the internal structure of the chromosome, including chromatid structure and chromomere morphology, is recommended.

53 SMITH, J. D. & DUNN, D. B.

The occurrence of 6-methylaminopurine in microbial deoxyribonucleic acids.

Biochem. J. 1955 : 60 : p. xvii.

The presence of 6-methylaminopurine in DNA from *Bacterium coli* 'B' and 'K12,' *Aerobacter aerogenes*, *Mycobacterium tuberculosis* and T_2 bacteriophage is reported (cf. Abst. 1554). It could not be detected in DNA from horse spleen, wheat germ or yeast or in RNA from *B. coli* '15T-.'

54 ARLEY, N.

The duplication mechanism of deoxyribonucleic acid.

Nature, Lond. 1955 : 176 : 465-66.

It is suggested that the specific peptide chains postulated by Gamow to be built up alongside the twin-helical strands of DNA (cf. *PBA*, Vol. XXIV, Abst. 1592) may act as templates for the synthesis of new DNA molecules, thereby avoiding the disentanglement difficulties of the direct DNA template theories. An intermediary protein template can also be assumed to be responsible for virus multiplication.

55 DOUNCE, A. L., MORRISON, M. & MONTY, K. J.

Role of nucleic acid and enzymes in peptide chain synthesis.

Nature, Lond. 1955 : 176 : 597-98.

It is suggested that the nucleotide sequence in a polynucleotide chain might act as a template for peptide synthesis in virtue of the sequence of nucleotide diads. In order that the diad sequence should store adequate information it is necessary to assume that the rings of adjacent nucleotides lie so close that free rotation about the sugar-base bond is prevented.

56 MOOKERJEA, A.

Cytology of different species of aroids with a view to trace the basis of their evolution.

Caryologia 1955 : 7 : 221-91.

Caryotype analyses of 28 species are given, on the basis of which suggestions are made as to the pattern of evolutionary development of the family. In many species, reproduction is vegetative and the flowers, if produced, are often sterile.

57 RUTISHAUSER, A.

Genetics of endosperm.

Nature, Lond. 1955 : 176 : 210-11.

Differences between homologous chromosomes with respect to heterochromatic structure have been detected in the B, C and E chromosomes of *Trillium grandiflorum* as the result of cold treatment. Such differences can serve as markers in tetrad analysis, if the endosperms are used as F_1 progeny. In the crosses $C_1C_2 \times C_1C_1$, $E_2E_3 \times E_2E_2$ and $B_1B_4 \times B_1B_1$, the expected types of endosperm were obtained, e.g. $C_1C_1C_1$ and $C_1C_2C_2$, arising as the result of first-division segregation, and $C_1C_1C_2$, the product of a second-division segregation. In one case of the second-division type, evidence of interference or of localized chiasmata was obtained.

58 D'AMATO, F.

Revisione citosistemica del genere *Colchicum*. I. *C. autumnale* L. *C. lusitanum* Brot. e *C. neapolitanum* Ten. (Cytosystematic revision of the genus *Colchicum*. I. *C. autumnale* L., *C. lusitanum* Brot. and *C. neapolitanum* Ten.).

Caryologia 1955 : 7 : 292-349.

A monographic account of the taxonomy, biometrical variation and chromosome numbers of the above three species is given.

59 WETTE, R.

Zur Evolution prämitotischer Vererbungsmechanismen. (The evolution of premitotic hereditary mechanisms).

Naturwissenschaften 1955 : 42 : 396-97.

The survival value of a system of self-duplicating protogenes, either occurring singly or associated in protochromosomes in a hypothetical primitive cell, is investigated statistically. It is concluded that protogenes or protochromosomes unessential for survival will disappear and that the association of protogenes into protochromosomes and their reduplication by "polyploidization" will be favoured by natural selection.

- 60 GLÄSS, E.
Untersuchungen über die Einwirkung von Schwermetallsalzen auf die Wurzel-spitzenmitose von *Vicia faba*. (**Investigations on the effect of salts of heavy metals on mitosis in the root tips of *V. faba***).

Z. Bot. 1955 : 43 : 359-403.

In experiments carried out at the Institute of Botany, Freiburg University, Germany, treatment with nitrates of iron, cobalt, nickel, copper, chromium, cadmium, manganese or zinc was found to result in chromosome stickiness, translocations and coiling in the root-tip cells of *V. faba* and to increase the rate of mutation. Ferric nitrate had the most pronounced effect, leading to a rapid browning of the root and to frequent chromosome aberrations. Treatment with manganese nitrate resulted in a rapid increase in the growth rate of the roots but did not have such a detrimental effect upon mitosis as did treatment with any of the other substances tested. Treatment for up to 30 mins. with any of the eight nitrates led to an acceleration of the division process which, however, showed a marked retardation after this period except in the case of manganese nitrate. The time taken to achieve a lethal effect varied according to the nitrate used and the concentration employed.

- 61 CROSBY, J. L.
The evolution of mitosis.
Proc. Univ. Durham phil. Soc. 1955 : 12 : 73-81.

In contrast to the view put forward by A. A. Boyden, the author suggests that mitosis arose very early in the evolutionary process. The essence of primeval mitosis is considered to be the simultaneous reproduction of genes. A system of genes reproducing thus can be regarded as a chromosome. The evolution of the spindle might well have occurred subsequently as a mechanism for synchronizing the division of a system containing more than one chromosome.

- 62 SCHOLES, M. E.
The effects of aldrin, dieldrin, isodrin, endrin and DDT on mitosis in roots of the onion (*Allium cepa* L.).
J. hort. Sci. 1955 : 30 : 181-87.

High doses of aldrin, dieldrin or isodrin had a slight toxic effect on resting cells. Treatment with isodrin or endrin resulted in slight stickiness between chromatids at anaphase, while DDT caused a delay in the early stages of prophase and a shortening of chromosomes at metaphase.

- 63 SNOAD, B.
The action of infra-red upon chiasma formation.

Chromosoma 1955 : 7 : 451-59.

Clone 20¹ of *Tradescantia bracteata* has mainly terminal chiasmata. If this clone is subjected to 3 hr. irradiation by infrared light of wavelength ca. 1 μ at 20° C., the relative frequency of interstitial chiasmata is increased. A similar increase is obtained by maintaining the plants at 20° C. for 8 days. If the chiasma frequency of the plants is reduced by subjecting them to a temperature of 8° C. for 30 days, the effect of subsequent infrared irradiation is to increase the number of terminal chiasmata only.

- 64 MOH, C. C. & WITHROW, R. B.
The potentiating effect of near infra-red on X-ray-induced chromosome breakage in broad bean.

Plant Physiol. 1955: 30 : Suppl. p. ix. (Abst.).

Irradiation of seedling roots with infrared of wave lengths of 735 and 800 m μ immediately before X irradiation caused increases in the frequency of chromatid breakage but treatment with 900 m μ had no effect.

- 65 SAX, K. & KING, E. D.
An X-ray analysis of chromosome duplication.
Proc. nat. Acad. Sci. USA 1955 : 41 : 150-55.

Study of the chromosomal aberrations induced by treating inflorescences of *Tradescantia* with 25 r. at 3° C. showed that the chromosomes of the microspores reacted as single threads when irradiated during the resting stage, as double threads at prophase and as four-partite threads at prometaphase and metaphase. Only half-chromatid aberrations occurred at metaphase whereas breaks involving one or both chromatids were induced by irradiation at prophase. The behaviour of the metaphase chromosomes may be related to the time and nature of duplication. The time of chromosome duplication, as indicated by the types of aberrations induced by X-ray treatment during meiosis and postmeiotic mitosis, is discussed in relation to the course of DNA synthesis as revealed by autoradiographic analysis.

- 66 WOLFF, S. & LUIPPOLD, H. E.
Metabolism and chromosome-break rejoining.
Science 1955 : 122 : 231-32.

Rejoining of X-ray-induced chromosome breaks

in *Vicia faba* was inhibited by exposure to low temperature, potassium cyanide, 95% carbon monoxide + 5% oxygen, anaerobic conditions or dinitrophenol immediately after irradiation, suggesting that an oxidative mechanism involving the high-energy phosphate bonds of ATP is necessary for rejoining.

67 MIKAELSEN, K.

The protective property of thiourea against radiation-induced chromosome aberrations.

Exp. Cell Res. 1955 : 8 : 400-03.

At the Institute of Genetics and Plant Breeding, Vollebakk, Norway, concentrations of between 5×10^{-5} M and 10^{-3} M of thiourea were found to give marked protection against the deleterious effects of chronic γ irradiation on shoots of *Tradescantia paludosa*. A concentration of 10^{-3} M proved the most effective, reducing the number of chromosome aberrations by 48% compared with the control.

68 KIHLMAN, B.

Chromosome breakage in *Allium* by 8-ethoxycaffeine and X-rays.

Exp. Cell Res. 1955 : 8 : 345-68.

Treatment of root-tip cells of *A. cepa* with 8-ethoxycaffeine resulted in chromosome stickiness in dividing cells and chromosome breakage in resting cells; the results were similar to those obtained by X irradiation at 75-100 r. In both cases the maximum effect was obtained when the cells were treated at late interphase. The influence of oxygen and nitrogen on the radiomimetic effects of 8-ethoxycaffeine was also investigated. Treatment in oxygen resulted in 3-6 times as many chromosome breakages as treatment in nitrogen; chromosome stickiness was also considerably more pronounced when oxygen instead of nitrogen was employed. The effect of temperature upon the level of chromosome breakages is also mentioned briefly.

69 KIHLMAN, B.

Studies on the effect of oxygen on chromosome breakage induced by 8-ethoxycaffeine.

Exp. Cell Res. 1955 : 8 : 404-07.

Treatment of root-tip cells of *Vicia faba* under aerobic conditions gave results similar to those obtained in previous experiments with *Allium cepa* (cf. Abst. 68). Although treatment in pure oxygen led to a marked increase in chromosome stickiness and breakage compared with treatment in pure nitrogen, little difference was

observed between treatment in pure oxygen and treatment in ordinary air.

70 VON ROSEN, G.

Radiomimetic reactivity arising after treatment employing elements of the periodic system, organic compounds, acids, electric current in an electrolyte, temperature shocks and ionizing radiation. Comparison with the mutagen effect.

Sock. Handl. 1954 : 8 : 157-272.

Pisum abyssinicum, *P. sativum*, *Allium cepa*, *Beta vulgaris* and *Vicia sativa* were subjected to the treatments described in PBA, Vol. XXIV, Abst. 1623. Similar results were obtained and are here given in detail. In addition, the effects of treatment with numerous other inorganic and organic compounds and of irradiation with various types of ionizing particles are described. Alkalis showed weak and acids marked radiomimetic activity; their effects are thought to be produced through their action on the pH and isoelectric point of cell constituents. Chromosome fragmentation was also induced by simple substituted hydrocarbons, organic acids, mustards, thiols, quinoline and phenols, while a weakly radiomimetic effect was obtained with urethanes. Experiments with mixtures of compounds gave varied results. Evidence was obtained that the threshold concentrations for inducing c-mitosis and radiomimetic effects, respectively, were similar for any one inorganic compound but differed for any one organic compound.

P^{32} was the most effective of four radioactive isotopes in inducing chromosome fragmentation and mustard gas was more effective than either nitrogen mustard or mustard oil. There was evidence that X irradiation and treatment with mustard oil are additive in effect when used in combination.

Treatment of *P. abyssinicum* with P^{32} or mustard gas resulted in a high frequency of plants with low vitality and a number of mutations from a colourless to a red maculum ($d \rightarrow D$).

Asynapsis was observed in a large proportion of the F_3 of *P. abyssinicum* \times *P. tibeticum* but did not occur in crosses of either of the two above species with an X-ray induced semi-sterile line of *P. abyssinicum*.

The author considers that, in general, all disturbances of tissue and cell balance, whether caused by physical or chemical action, are able under certain conditions to produce radiomimetic effects and mutations.

- 71 SHARMA, A. K. & ROY, M.
Orcein staining and the study of the effect of chemicals on chromosomes.
Chromosoma 1955 : 7 : 275-80.

Root tips of a number of monocotyledons and dicotyledons were subjected to treatment with alloxan and subsequently with coumarin, oxyquinoline or phenol for 3-4 hrs., then heated in an orcein-acid mixture for 10-40 seconds and mounted in 1% orcein. Clear metaphase plates were obtained after heating for 10 seconds but longer periods caused considerable erosion and fragmentation. Heating for periods of longer than 40 seconds resulted in complete loss of stainability. It is suggested that pretreatment with alloxan, coumarin, oxyquinoline or phenol causes depolymerization of the deoxyribose nucleic acid and lability in the nucleoprotein linkage of certain segments, thus giving rise to fragmentation in the course of subsequent heating.

- 72 ROSSI, A.
L'azione citogenetica dell'idrazide maleica sugli apici radicali di *Allium cepa* L. (**The cytogenetic action of maleic hydrazide on root tips of *A. cepa* L.**).
Caryologia 1955 : 7 : 205-18.

The substance proved to be a strong preprophase inhibitor and to have a certain mutagenic effect, producing many simple fragments, some chromatid bridges and a few rings. A very slight c-mitotic action was also observed.

- 73 QUERCIOLI, E.
L'azione citofisiologica e citogenetica delle sostanze del gruppo delle cumarine in rapporto alla loro costituzione molecolare. (**The cytophysiological and cytogenetic action of coumarin derivatives in relation to their molecular constitution**).
Caryologia 1955 : 7 : 350-84.

The effects of 15 coumarin derivatives on the roots of *Allium cepa* were investigated. The principal effects observed were root induction, preprophase inhibition, stickiness and induced mutation. All these effects, save the last, appeared to depend on the presence of the lactone ring and the active double bond of the coumarin molecule and were little affected by substituent groups. The latter, however, affected mutagenesis.

- 74 STEFFENSEN, D.
Breakage of chromosomes in *Tradescantia* with a calcium deficiency.
Proc. nat. Acad. Sci. USA 1955 : 41 : 155-60.

Growing plants of a clone of *T. paludosa* in

cultural solutions containing suboptimal concentrations of Ca resulted in a considerable increase in the frequencies of chromosomal aberrations and micronuclei in the microspores and of micronuclei in the pollen. It is suggested that bivalent cations may bind together the macromolecular constituents of the chromosome to give structural stability.

- 75 BARTOŠ, J.
(Cell division in cultures of sections of carrot roots (*Daucus carota*).
Čeh. Biol. (Czech. Biol.) 1954 : 3 : 213-21.
[Russian].

Anomalous cell division was observed in material grown in a modified Gautheret tissue culture. It is attributed either to amitosis or to nuclear fusion.

- 76 CORTINI, C.
Azione citogenetica delle sostanze del gruppo delle podofilline. (**Cytogenetic action of substances of the podophyllin group**).
Caryologia 1955 : 7 : 72-86.

The effects of various commercial preparations of podophyllin on onion root tips are described. The substances have a typical c-mitotic effect but no action on the centromere. The c-mitotic effect tends to diminish after 24 hours or less and consequently few polyploid cells were observed unless the treatment was repeated, in which case some mutagenic activity was also observed. This was more pronounced with podophyllotoxin, whereas picropodophyllin had no effect at all.

- 77 BURRONI, M.
L'azione citogenetica degli alcaloidi del gruppo della veratrina. (**The cytogenetic action of alkaloids of the veratrine group**).
Caryologia 1955 : 7 : 87-97.

C-mitotic effects were observed after treating onion root tips with solutions of veratrine, veratrine sulphate and extracts of *Veratrum viride*. Polyploid and binucleate cells were observed after treatment with veratrine sulphate.

- 78 ROSSI, A.
L'azione citogenetica del solfato di berberina. (**The cytogenetic action of berberine sulphate**).
Caryologia 1955 : 7 : 179-90.

In low concentrations berberine sulphate acted as a preprophase inhibitor on onion root tips and at higher concentrations it exerted a mitoclastic effect.

- 79 SHARMA, A. K. & SARKAR, S. K.
A new technique for the study of chromosomes of palms.

Nature, Lond. 1955 : 176 : 261-62.

Fixation in a saturated solution of esculine in water has proved to be highly satisfactory, the best results being obtained by treating the root-tips for the first 2 hours at 2-4° C. and then for 22 hours at 12-18° C., followed by heating for a few seconds in a 9 : 1 mixture of 2% acetoorcein and N HCl, before smearing in orcein.

- 80 SWAMINATHAN, M. S., MAGOON, M. L. & MEHRA, K. L.

A simple propiono-carminc PMC smear method for plants with small chromosomes.

Indian J. Genet. 1954 : 14 : 87-88.

Material is fixed at a low temperature for 24 hours or longer in a 3 : 1 mixture of absolute alcohol and propionic acid saturated with ferric acetate. It is then placed in a drop of propiono-carminc, gently heated to aid differentiation, smeared and finally sealed in the usual way to form a temporary preparation.

- 81 HIEMENZ, G.

Untersuchungen an *Salpiglossis variabilis* über Gonenkonkurrenz und selektive Befruchtung und ihre Auswirkung auf die Nachkommenschaft. (**Investigations on gone competition and selective fertilization in *S. variabilis* and their effect on the next generation**).

Biol. Zbl. 1955 : 74 : 337-70.

Experiments were carried out at the Institute for Research on Inheritance and Breeding, Berlin-Dahlem, to obtain information on (a) whether the progeny of ♀ plants pollinated with mixed pollen obtained from plants of different genotypes contained individuals possessing the characters of more than one ♂ parent, (b) whether, when mixed pollen from plants of different genotypes is used, the pollen from one genotype has a selective advantage over that from other genotypes and whether any connexion exists between the ability of a genotype to compete successfully in fertilization and the vigour of its progeny and (c) whether competition takes place between egg cells. The results failed to substantiate claims by Russian research workers that an egg cell may be fertilized by more than one pollen grain. The pollen tubes of some genotypes had a selective advantage over those of other genotypes but competitive ability of the pollen tube

was not associated with growth vigour of the progeny. Egg cells homozygous for flower colour had a selective advantage over heterozygous egg cells. Pollination with moderate amounts of pollen gave rise to seedlings possessed of a greater degree of vigour than when the ♀ parent was overpollinated.

- 82 POLJAKOV, I. M. & DMITRIEVA, A. N.
(New ways of investigating fertilization processes in higher plants with the help of radioactive isotopes).
 Ž. obšč. Biol. (J. gen. Biol.), Moskva 1955 : 16 : 3-16. [Russian].

A method of studying multiparental pollination and selective fertilization in such plants as maize and tobacco has been developed. It is based on the use of pollen carrying the isotopes S³⁵ and P³².

DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

- 83 MARMUR, J. & FLUKE, D. J.
Uniformity of ionizing radiation action on several transforming factors of *Pneumococcus*.
 Arch. Biochem. Biophys. 1955 : 57 : 506-14.

Highly polymerized DNA from a donor strain bearing three factors for resistance to penicillin, streptomycin and sulphanilamide, respectively, and one factor controlling the ability to utilize mannitol, was subjected to bombardment with 2-m.e.v. electrons and tested with a view to determining the size of the radiation-sensitive particles carrying transforming activity. The four factors showed no differences in reaction to irradiation. There appeared to be two molecular weights which were sensitive to radiation, one smaller than 1,000,000 and the other greater than 2,000,000. There is some indication that the probability of two factors per particle is higher for the larger particles.

- 84 MAYR-HARTING, A.
The acquisition of penicillin resistance by *Staphylococcus aureus*, strain Oxford.
 J. gen. Microbiol. 1955 : 13 : 9-21.

The above strain produced, in any one mutational step towards penicillin resistance, a number of mutants differing in various characteristics, one of which was the degree of penicillin resistance. The most resistant first-step mutant was approximately five times more resistant than the least resistant. No evidence was obtained that the actual degree of resistance

was influenced by the concentration of penicillin at which the mutants were isolated. The mutants also differed in the frequency with which they arose, growth rate in the absence or presence of penicillin, phenotypic distribution of penicillin resistance in their populations, and, in some cases, colony morphology. Acquisition of resistance to penicillin was often accompanied by pigmentation.

- 85 ROGERS, P. & McELROY, W. D.
Biochemical characteristics of aldehyde and luciferase mutants of luminous bacteria.
Proc. nat. Acad. Sci. USA 1955 : 41 : 67-70.

Seven nonluminous mutants of *Achromobacter fischeri* were induced by ultraviolet irradiation, loss of luminescence being unaccompanied by any defects in growth. Light emission was stimulated by dodecyl aldehyde in two of the mutants but in the remaining five luminescence could not be restored by aldehyde or any other factors known to be involved in the light-emitting reaction. Probably synthesis of the flavoprotein luciferase was blocked in these five mutants. The results suggest that at least two genes are involved in the control of light emission.

- 86 WAINWRIGHT, S. D. & NEVILL, A.
Some effects of postirradiation treatment with metabolic inhibitors and nutrients upon ultraviolet irradiated spores of *Streptomyces* T12.
Canad. J. Microbiol. 1955 : 1 : 416-26.

Investigations were carried out on the effects of posttreatment with the following substances upon survival and the frequency of heritable changes expressed as morphological variation: sodium arsenate, sodium azide, dinitrophenol, N compounds, sugars, potassium phosphate, sodium acetate and sodium sulphate. Modification of the frequency of variants was not necessarily accompanied by any detectable effect upon survival. Treatment with sodium arsenate resulted in an increase in the frequency of variants whereas treatment with casein hydrolysate, ammonium chloride, arabinose or potassium phosphate caused a reduction; the other agents did not modify the frequency of variants.

- 87 WAINWRIGHT, S. D. & NEVILL, A.
Relationships between postradiation treatments with iodoacetate and light.
Canad. J. Microbiol. 1955 : 1 : 427-39.
Posttreatment of ultraviolet-irradiated spores

of *Streptomyces* T12 with iodoacetate and then with light resulted in a higher proportion of survivors but not in a change in the frequency of variant colonies, compared with irradiated spores photoreactivated in distilled water (cf. Abst. 86).

- 88 ANDERSON, E. H. & BILLEN, D.
The effect of temperature on X-ray induced mutability in *Escherichia coli*.
J. Bact. 1955 : 70 : 35-43.

The effect of temperature on the rate of mutation in four strains of *E. coli* subjected to X irradiation was studied. The optimal temperature for the induction of mutants was found to be 18-24° C. At temperatures below 18° C. the number of mutants obtained fell considerably.

- 89 LOUTIT, J. S.
Auxotrophic mutants of *Pseudomonas aeruginosa*.
Nature, Lond. 1955 : 176 : 74-75.

The penicillin technique was satisfactory for the isolation of induced auxotrophic mutants provided the organisms were grown not in broth but in minimal agar for the period of incubation necessary for the full expression of the mutants. Genetic exchange probably occurred during incubation in broth, masking any mutants present.

- 90 FISHER, K. W.
The influence of some dicarboxylic acids on zygote formation in *Escherichia coli* K-12.
J. gen. Microbiol. 1955 : 13 : ii-iii.
(Abst.).

Very little combination occurred when two auxotrophic strains were aerated together at 37° in M/20 phosphate buffer (pH 7.2) for 30 minutes. Under the same conditions but with the buffer supplemented with glucose and aspartic acid a high rate of recombination occurred, the number of prototrophs formed depending on the concentration of aspartic acid. Recombination was stimulated to a lesser degree by succinic, fumaric and malic acids, together with glucose, at 5.6 pH. The increased rate of recombination was reversed by malonic acid. Alone or in combination with glucose, NH_4^+ did not affect recombination.

- 91 MACCACHARO, G. A.
Cell surface and fertility in *Escherichia coli*.
Nature, Lond. 1955 : 176 : 125-26.

Evidence has been obtained from pH-precipitability tests, staining behaviour and nephelometric analysis that F^+ and F^- cells differ in

surface charge. Electron-microscope examination revealed no morphological dissimilarity at the cell surface corresponding to the differences in F polarity.

92 FRÉDÉRICQ, P.

Recherches génétiques sur la localisation du prophage λ sur le chromosome d'*E. coli* et sur son intervention dans la ségrégation de divers marqueurs. (Genetical investigations on the localization of prophage λ on the chromosome of *E. coli* and on its influence on the segregation of different markers).

CR Soc. Biol., Paris 1955 : 149 : 840-43.

In ten strains of *Escherichia coli* investigated, it was found that, when prophage λ is transferred from lysogenic to nonlysogenic bacteria in the course of recombination, the prophage always joins the chromosome at the same locus. Crosses between lysogenic and nonlysogenic strains result in the elimination of certain recombinations, especially when it is the F⁺ parent that is lysogenic. As crosses between two lysogenic strains frequently give rise to a proportion of nonlysogenic progeny, it is postulated that the phage does not become an integral part of the chromosome but merely attaches itself to a locus that behaves as a negative allele.

93 BACKUS, M. P. & STAUFFER, J. F.

The production and selection of a family of strains in *Penicillium chrysogenum*.

Mycologia 1955 : 47 : 429-63.

A review is given of the origin, interrelationships and characteristics of the chief strains comprising the so-called Wisconsin family, developed at the University of Wisconsin. All the strains in the group are descendants of Wis. Q176, which was obtained in 1945 and gave yields of penicillin greater than those of any strain previously known, and are in some cases the result of spontaneous mutation and in others of exposure to ultraviolet irradiation or treatment with a nitrogen mustard. Some of the variants produce more than ten times the amount of penicillin produced by Wis. Q176.

94 IMŠENECKÝ, A. A.

(Physiological characteristics of variant forms of microorganisms, obtained with the help of strongly effective agents).

Mikrobiologija (Microbiology), Moskva 1955 : 24 : 285-90. [Russian].

Methods of selecting active strains among

mutant forms of microorganisms, obtained by irradiation and other strong agents, are discussed. They should be based on the principle of discarding forms with certain morphological characteristics that suggest some form of degeneration.

95 CURTIS, R. W., BACKUS, M. P. & STAUFFER, J. F.

The induction and behavior of acenaphthene-requiring strains of *Penicillium chrysogenum* Thom.

Plant Physiol. 1955 : 30 : Suppl. vii-viii. (Abst.).

Mutants with an incomplete requirement for acenaphthene were induced by treatment with this chemical.

96 ATWOOD, K. C. & PITTINGER, T. H.

The efficiency of nuclear mixing during heterokaryon formation in *Neurospora crassa*.

Amer. J. Bot. 1955 : 42 : 496-500.

"The mixing of *Neurospora* nuclei during heterokaryon formation in conidial mixtures was studied in a three-component system where the frequency of nuclei involved in new associations, dependent on hyphal anastomoses, could be compared with that of nuclei entering the mixture in pre-existing associations. The frequency of a given nuclear type was not influenced by the manner of its introduction into the mixture, whether in separate cells or already partially heterokaryotized. Selection as a source of error was controlled. It is concluded that nuclear mixing is thorough under the experimental conditions."

[Authors' summary]

97 MATHIESON, M. J. & CATCHESIDE, D. G.

Inhibition of histidine uptake in *Neurospora crassa*.

J. gen. Microbiol. 1955 : 13 : 72-83.

Investigations were carried out on the histidine-requiring mutants K12, K26 and K34. The genes determining this requirement in K12 and K26 are 0.69 units apart in the left arm of linkage group I, whereas the relevant gene in K34 is situated in group IV, 32.6 units from *pan*. The response to histidine of the three mutants was markedly affected by the genetic background. Only K26 accumulated imidazole derivatives. Like other histidine-requiring mutants, K12, K26 and K34 were inhibited by certain other aminoacids in combination with either arginine or lysine, the degree of inhibition differing according to the mutant. Inhibition was not a function of histidine requirement.

- 98 DODGE, B. O.
Further studies relating to dominance and ascus abortion in *Neurospora tetrasperma*.
Mycologia 1955 : 47 : 494-505.

A survey is given of work carried out by the author and his colleagues in isolating homocaryotic races of the genotypes *AI*, *aI*, *Ai* and *aI* from heterocaryotic material, *A* being a determinant for mating type and *I* being a gene causing induration of the ascus and abortion of spores on certain media. The production of asci homozygous for *E* is also reported (cf. *PBA*, Vol. XX, Abst. 1465). While the heterozygotes (*AaEe*) produce spores on a new-potato steep dextrose medium, the number of spores being eight or fewer depending on the races used in mating, the strains homozygous for *E* (*AaEE*) abort without spore formation, and only particularly favourable combinations develop asci.

- 99 GALJCOVA, R. D.
(The effect of X-irradiation upon the content of thiol groups in yeasts).
Mikrobiologija (Microbiology), Moskva 1955 : 24 : 137-40. [Russian].

Irradiation with dosages of up to 120,000 r. doubled or trebled the amount of unattached thiol groups in yeast cells. The changes were heritable and persisted for up to 100 generations.

- 100 RAUT, C. & SIMPSON, W. L.
The effects of X-rays and of ultra-violet light of different wavelengths on the production of cytochrome-deficient yeasts.
Arch. Biochem. Biophys. 1955 : 57 : 218-28.

The frequency of cytochrome-deficient petite yeast cells is only slightly increased by X irradiation but is greatly increased by ultra-violet light, especially around 2600Å, the absorption maximum of nucleic acid. It is suggested that petite cells may arise through inactivation of pentose nucleic acid in the mitochondria.

- 101 LOGINOVA, L. G.
(Changes in activity of yeasts in relation to external conditions).
Mikrobiologija (Microbiology), Moskva 1955 : 24 : 151-54. [Russian].

A thermophilic strain of yeast, obtained by culturing at 44°C., fermented maltose and multiplied more rapidly at 39-40°C. than another thermophilic strain cultured at 40°C.

- 102 IMŠENECKIĬ, A. A. & PEROVA, K. Z.
(Adaptation of yeasts to toxins).
Mikrobiologija (Microbiology), Moskva 1955 : 24 : 147-50. [Russian].

Two races of *Saccharomyces cerevisiae*, one showing an improved degree of resistance to corrosive sublimate and the other to phenol, have been obtained by culturing on media with gradually increased concentrations of these chemicals.

- 103 WICKERHAM, L. J.
New materials and procedures for genetic studies of yeasts.
Nature, Lond. 1955 : 176 : p. 22.

Information is given on the procedures used for interspecific hybridization and on the hybrids obtained at the Northern Utilization Research Branch, Agricultural Research Service, US Department of Agriculture, Peoria, Ill. The author is considering assigning the group consisting of *Saccharomyces lactis*, *S. fragilis* and *S. marxianus*, *Zygosaccharomyces ashbyi*, *Z. dobzhanskii* and several other species to a new genus *Dekkeromyces*. Interspecific hybrids within this group may be distinguished from the parental species by their pigmentation or fermentative capacities. Species have been crossed which differ widely in sexual behaviour. A yeast able to ferment both lactose and maltose has been obtained by mating the maltose fermenter *Z. dobzhanskii* with the lactose fermenter *S. fragilis*.

- 104 VERONA, O. & TOLEDO, O. Z. DE
Indagini speciologiche sopra alcuni lieviti isolati dai fiori di vite nel territorio di S. Paolo in Brasile. **(Taxonomic studies on some yeasts isolated from vine flowers in the region of S. Paulo in Brazil).**

Ann. Fac. Agr. Pisa 1954 : 15 : 163-91.
Examinations were made of the yeast populations collected from flowers of 15 hybrids and 28 varieties of vine growing at the Instituto Agronômico de Campinas in Brazil. The strains isolated, which are described, include a new variety of *Candida intermedia*, designated var. *ethanophila*, and three new species provisionally ascribed to the genus *Anthobastomyces*.

- 105 ROWELL, J. B.
Functional role of compatibility factors and an *in vitro* test for sexual compatibility with haploid lines of *Ustilago zeae*.

Phytopathology 1955 : 45 : 370-74.
Six monosporidial haploid lines bearing different

combinations of the compatibility factors *a* and *b* (cf. *PBA*, Vol. XXV, Abst. 87) were mated in all possible combinations. Fusion occurred only between sporidia with dissimilar *a* alleles and the resulting dicaryotic hyphae lacked vigour and stability unless dissimilar *b* alleles were present. The production of vigorous infection hyphae in agar culture afforded a rapid means of identifying compatibility factors in isolates collected from the field but proved unreliable in lines cultured on agar over long periods. The infection of inoculated corn seedlings provided a more reliable indication of compatibility.

- 106 BUXTON, E. W. & RICHARDS, M. G.
Pathogenic strains of *Fusarium oxysporum* Fr. distinguished by their differential tolerance to inhibition by various actinomycetes.

J. gen. Microbiol. 1955 : 13 : 99-102.

Pathogenic strains of *F. oxysporum* showed differences in ability to tolerate the growth products of actinomycetes. This variation offers a means of distinguishing isolates of *F. oxysporum* *in vitro* in genetical investigations.

- 107 BLUNCK, H.
Fortschritte im Wissen vom Wesen und Wirken der Viruskrankheiten. (**Progress in the knowledge of the nature and mode of action of virus diseases**).
Z. PflKrankh. 1955: 62 : 273-336.

Work on the structure, mode of transmission, chemical constitution, mutation and methods of reproduction of viruses is reviewed.

- 108 WEBB, R. E.
A new strain of the potato leaf roll virus.

Amer. Potato J. 1955 : 32 : 173-79.

An isolate of leaf-roll virus from potato seedling X927-3 has been identified as a new form (strain 5), differing from strain 1 in its rate of becoming systemic in *Datura stramonium*, degree of symptoms, and erratic incubation period in Katahdin, Chippewa and some other varieties.

- 109 KNIGHT, C. A. & FRASER, D.
The mutation of viruses.

Sci. Amer. 1955 : 193 : No. 1 : 74-78.

This popular article discusses viral mutation with reference to research on variation in the composition of the protein and nucleic acid and various attempts to induce changes in the composition of these two constituents.

CROP PLANTS

- 110 KUCKUCK, H.
Sind in der Pflanzenzucht noch Fortschritte zu erzielen? (**Can further advances be achieved in plant breeding?**)

Arch. dtsh. LandwGes. 1955 : 15 : 244-53.

After reviewing progress achieved with horticultural and agricultural crops and with forest trees in the course of this century by means of selection, hybridization, the exploitation of heterosis and the induction of mutations, the writer goes on to discuss the role of the plant breeder in the future. Although considerable advances have been made in breeding for resistance to diseases, drought, frost and, in the case of cereals, lodging and shedding, future possibilities are at least as great as past ones. The breeder will have to contend with new races of pathogens and, as cultural conditions change and new areas of the earth's surface are opened to human cultivation, he will be required to breed for adaptability to different conditions. In the view of the author, the artificial induction of mutations offers the best possibility for the development of new varieties of crop plants.

- 111 **Annual Report of the Scottish Plant Breeding Station, Pentlandsfield, Roslin, Midlothian, 1955 : Pp. 36.**

The Scottish Plant Breeding Station has now been transferred from Craigs House, Corstorphine, to new premises at Pentlandsfield, Roslin, Midlothian. Instead of the usual annual report, a review is therefore presented assessing the work carried out on the following since 1921 at the former station: cereals, chiefly oats; herbage plants and genecology; various problems in potato breeding and genetics, particularly resistance to late blight, viruses and eelworm; *Brassica* root crops; and sugar beet. The greater part of this work has been referred to in *Plant Breeding Abstracts* in summaries of the earlier annual reports.

The Research and Experimental Record of the Ministry of Agriculture, Northern Ireland 1952-53 (1955) : 3 : Pp. 273.

- 112 *Plant Breeding Division. (pp. 202-07).*

Oats. Breeding is in progress to develop strains with improved resistance to lodging, combined with high yield and short plump grain; promising lines have been obtained from Stormont Arrow x Elder. Other hybrid progenies are being selected for resistance to *Erysiphe graminis*.

Perennial ryegrass. The blind-seed resistant ryegrasses Irish Commercial and Devon Eaver are being used as the basis of selection and breeding, the aim of which is the development of a strain capable of replacing Irish Commercial and possessing resistance to blind seed and the capacity to give high yields of herbage as well as satisfactory yields of high-quality seed.

Flax. Progress is reported in back-crossing to introduce disease resistance into high-quality fibre types. Lodging resistance is also receiving attention; in order to achieve a satisfactory degree of resistance it may be necessary to accept some sacrifice in fibre yield and quality.

113 *Plant Pathology Division.* (pp. 208-16).

Potato. Assistance was given to J. Clarke and other growers in their work on breeding for late-blight resistance.

Flax. Families showing a high degree of resistance to *Polyspora lini* have been obtained by back-crossing the hybrid between the linseed La Plata and the fibre variety Tekstiljščik [Textile Worker] to the latter parent or to other fibre flaxes. La Plata has proved to be highly resistant not only to *P. lini* but also to *Colletotrichum linicola*, *Phoma* sp. and *Melampsora lini*; Tekstiljščik is resistant to *M. lini* but susceptible to most other diseases.

Two new varieties resistant to *Fusarium lini* were subjected to field trials.

114 **Thirty-fifth Report and Accounts of the National Institute of Agricultural Botany 1954** : Pp. 50.

An account is given of trials carried out on varieties and strains of cereals, field pea, field bean, potato, sugar beet, forage beet and many other crops at different centres in Britain. Other activities briefly described include investigations on the following: varietal reactions of wheat to yellow rust and identification of races of this pathogen; varietal responses in wheat and barley to three races of loose smut; susceptibility of potato varieties to virus Y, leaf roll and late blight; ear sprouting in wheat varieties; and identification of wheat varieties by observations on the development of seedlings grown in continuous light after vernalization.

115 HAYWARD, P. R.

Sixth report of the trial and experimental work carried out at "Throws" Little Dunmow, 1953/54.

Hasler & Co. Ltd. Dunmow : Pp. 36.

Winter wheat. The F_2 generations of Nord Desprez x Holdfast, Petit Quin Quin x Eclipse and Benoist 40 x Eclipse were selected. Selection 1/52, a true-breeding red-chaffed and

red-grained rogue of Petit Quin Quin, gave a comparable yield to Eclipse and was slightly more resistant to lodging. The selection is to be further tested; it is somewhat more susceptible to yellow rust than Eclipse.

Vicia faba. Winter-bean stocks have been built up by selection of high-yielding progenies from mainly cross-bred commercial material (cf. *PBA*, Vol. XXIV, Abst. 2736). These stocks and composites of them continued to give encouraging results.

Lines developed by crossing winter and spring types are under trial. Particularly when spring sown, populations from this combination have shown high yielding capacity.

116 TN., O.

Effektivt växtskydd kräver resistensförfädlng. (**Effective plant protection demands breeding for resistance**).

Lantmannen, Stockholm 1955 : 39 : 723-24.

At the annual meeting of the Swedish Seed Association held at Svalöf on 19 July 1955, O. Tedin presented a paper on Plant breeding and plant protection, in which he stressed the need for a more intensive programme of breeding for disease resistance in Sweden, with selection based on resistance in the greenhouse or laboratory rather than on field resistance alone. G. Olsson spoke next on some current problems in connexion with the breeding of oil plants. He noted some recent improved varieties and pointed out that there is still much scope for improvement by selection and crossing; he also mentioned work on the so-called artificial rape produced by crossing cabbage and turnip rape. G. Andersson described the new Svalöf wheat Svale, which has given good yields, is resistant to mildew and other unspecified diseases and is more winter hardy than its parents, Eroica I and Skandia II. He said that hybrids of Eroica I with Odin, Robur and Virtus are also under investigation and mentioned that the new spring wheat Friskus, which equals Progress in earliness and straw strength but is higher-yielding, is expected to be released in 1957. Värne, a new rye from Petkus x Kungsråg [King's rye], was said to be promising.

117 SIKKA, S. M. & SWAMINATHAN, M. S.

Fifty years of botanical research at the Indian Agricultural Research Institute.

Euphytica, Wageningen 1955 : 4 : 173-82.

The work of the Indian Agricultural Research Institute in breeding, cytogenetics, plant introduction, systematic botany and plant physiology

is outlined, emphasis being laid on achievements in crop improvement.

Proceedings of the First Scientific Workers Conference held in the Agricultural College and Research Institute, Coimbatore, on 2nd August 1951 (1953) : Pp. 271.

- 118 Krishnaswamy, C. S., Govindaswamy, C. V., Adyantiya, N. R. & Rangaswamy, G. *Studies on varietal resistance of rice to the 'blast' disease* (*Piricularia oryzae* Cav.). (pp. 7-19).

The work of testing varieties and selections for resistance to blast (*P. oryzae*) during 1943-50 at the Agricultural Research Institute, Coimbatore, and at two other stations in Madras is described. Two of the long-duration varieties showing resistance, Co. 25 and Co. 26, have been released. None of the medium or short duration varieties or selections were highly resistant.

- 119 Rao, P. K., Narasimhamurthy, K., Durairaj, V. & Venkataraman, K. *Improvement of grain size in the Talavirichan cholam* (*Sorghum roxburghii*) of the Madras state. (pp. 20-22).

Two strains, AS7817/1 and AS7817/4, superior to the standard Co.3 in grain size and yield, have been developed from crosses of the small-grained variety Talavirichan cholam [Lax-headed sorghum] with *S. conspicuum* from Africa.

- 120 Ramaswami, V. *Cotton improvement work in progress for the winter area in the southern districts of the Madras state.* (pp. 22-28).

A review is given of selection and breeding to obtain improved long-staple cottons of the Cambodia type. In recent trials, selections 0734 [(X82 x 7625) x 7727] and 9995 (X82 x 7733) surpassed Cambodia 2 in yield and also in staple, ginning and spinning properties. The parental lines 7727 and 7733 were derived from *Gossypium hirsutum* x *G. barbadense*; X82 is fairly resistant to jassid.

- 121 Rao, P. K., Nambiar, A. K., Krishnaswami, P. & Menon, P. M. *Evolution of short duration hybrids in cumbu.* (pp. 29-35).

Short-duration, high-yielding F_1 hybrids of selections of *Pennisetum typhoides* have been obtained at the Millet Breeding Station, Coimbatore. In general, the more diverse the geographical origin of the parents the greater was the degree of hybrid vigour. The parents of the most promising combinations are being

inbred until complete homozygosity is reached. Two hybrids, X1 and X2, have already been released.

- 122 Krishnaswamy, N. & Raman, V. S. *Cytogenetical studies in the interspecific hybrid of Pennisetum typhoides, Stapf and Hubbard x Pennisetum purpureum, Schumacher.* (pp. 43-71).

P. typhoides ($2n = 14$) and *P. purpureum* ($2n = 28$) both showed regular bivalent formation. During meiosis in the F_1 interspecific hybrid $7_{II} + 7_I$ were usually formed, 8-10 $_{II}$ being less frequent; 98% of the pollen grains were sterile. Selfing and back-crossing to either parent were equally unsuccessful. *P. purpureum*, it is suggested, is an allotetraploid having two subgenomes, A and B, the former being homologous with the genome of *P. typhoides*. Allosyndesis among members of subgenome B accounts for numbers of bivalents above 7. Subgenome A of *P. purpureum* may have factors for bristle length and other characters which are dominant over those carried by *P. pennisetum*. The F_1 is promising as a vigorous fodder plant highly resistant to rust. Amphidiploids have been produced from the hybrid (cf. *PBA*, Vol. XIX, Abst. 1837).

- 123 Shanmugasundaram, A. & Venkatana-rasing Rao, M. B. *Dormancy in rice seed and its importance in rice breeding.* (pp. 72-76).

Short-duration varieties displayed dormancy in tests at Coimbatore. Most of the dormant types were lower yielding than the nondormant strains popular among cultivators. Crosses between dormant and nondormant types are being studied.

- 124 Narasinga Rao, U., Rangacharlu, V. S. & Kuppuswami, B. S. *Studies on inheritance of yield characters in clones of strawberry* (*Fragaria vesca*, Linn) and *pyrethrum* (*Chrysanthemum cinerariaefolium*, Preg). (pp. 82-90).

Progenies of selected parents of strawberry and pyrethrum showed marked intraclonal variation in yield. The mean yield of parents and clonal progenies were however significantly and positively correlated. It is therefore suggested that in the selection of clonal planting material use should be made of as many high-yielding parents as possible instead of relying upon a single selection.

- 125 Jagannatha Rao, C. *Cotton breeding research in the Madras state.* (pp. 90-98). Information is given on the strains already released in the different regions and on current

aims in breeding, estimates of the economic benefits achieved and expected being provided.

- 126 *Balasubramaniyan, C., Rajagopalan, K. & Jayaraman, M. V. A preliminary note on drought resistance in paddy. (p. 171-76).*

A simple method of determining reaction to atmospheric drought is described. The two varieties tested, MTU17 and Co.13, were equally resistant to atmospheric drought, the transpiration: evaporation ratios being approximately similar. MTU17 however used water more economically and had a better developed root system.

- 127 *Fazlullah Khan, K. & Ramalingam, V. Study of some promising tapioca varieties with special reference to their food value. (pp. 177-88).*

Information on the morphological characteristics, yield and starch content of 15 varieties is presented.

- 128 *Neelakantan, L., Anjaneyulu, V. S. R. & Ramamohana Sastry, V. Chillies improvement work in the Madras state. (pp. 129-200).*

Breeding at the Agricultural Research Station, Lam, Madras, is described, the chief problem being resistance to thrips (*Scirtothrips dorsalis*). G1 and its reselection 1402 have the advantages of high yield, persistent calyx and tolerance of thrips. In an attempt to obtain resistant types a wide range of collections is now being selected and used in hybridization.

- 129 *Anjaneyulu, V. S. R. Work for the improvement of coriander in Guntur. (pp. 200-05).*

The results of trials of collections from Guntur and other districts are described. Single-plant selections of one particular sample from Guntur show promise of providing material for the development of a high-yielding type with a large mericarp.

- 130 *Seshadri, C. R. & Varisai Muhammad, S. Study of inheritance of certain characters in the castor (*Ricinus communis*, Linn.). (pp. 230-44).*

In investigations at the Agricultural Research Station, Tindivanam, South Arcot, red stem vs. green stem depended upon two complementary factors. Spininess of the stem and petioles was monogenic and incompletely dominant over smoothness. Red extra-floral nectaries of the large, stalked type were dominant over yellow, and crimson stigma was dominant over green-yellow, each of these character pairs depending

upon a single-gene difference. In a cross between parents with green and rose-red capsules, all the F_1 plants bore green capsules; the F_2 segregated in the ratio of 3 green : 1 non-green, creamy-yellow, light rose-red and rose-red capsules being also observed. Spininess of the capsules was monogenic and partially dominant over smoothness. Warty vs. smooth epicarp depended upon a single-factor difference, wartiness being partially dominant. Stalked capsules were monogenically conditioned and partially dominant over sessile. Within the stalked type, branched stalk was incompletely dominant over nonbranched, a single-gene difference being involved.

- 131 *Abraham, P. & Venugopalan Nambiar, P. K. Observations on some South Indian varieties and forms of pepper (*Piper nigrum*, Linn.). (pp. 252-69).*

A study was made of the morphological characters and sexuality of varieties occurring in Malabar, South Kanara and Travancore and also of some wild forms. The cultivated peppers showed considerable variation in the percentage of bisexual flowers, the greater the degree of hermaphroditism the higher the yield. The cultivated peppers probably arose from wild monocious forms, representatives of which are still to be found in the Western Ghats. The marked morphological differences between varieties from Malabar and those from Travancore suggest a dissimilar origin.

Proceedings of the Second Scientific Workers' Conference held in the Agricultural College and Research Institute, Coimbatore, on 16th August 1952 (1953) : Pp. 122.

- 132 *Fazlullah Khan, J. K. & Ramalingam, V. A note on the floral morphology and pollination effects in seedless breadfruit, *Artocarpus incisa* (Linn) syn. *A. communis* (Forst.). (pp. 1-7).*

With a view to developing a pollination technique, observations were made on the floral biology of the breadfruit at Coimbatore. In addition, fruit set with open pollination, selfing and application of pollen from the jack fruit were investigated.

- 133 *Adyanthaya, N. R. & Rangaswamy, G. Distribution of stomata in relation to 'blast' disease of rice. (pp. 90-94).*

Using plants 15 or 30 days old, blast-resistant varieties were found to possess lower numbers of stomata per unit area of leaf than susceptible ones.

- 134 Narasinga Rao, M. B. V. *Use of chemicals in inducing mutations in rice.* (pp. 95-101).

Treatment of seed with acenaphthene or Ceresan and of flowers with benzene vapour at the Paddy Breeding Station, Coimbatore, has resulted in the production of mutants which are of slightly longer duration, more vigorous and higher yielding than the parents. The possible genetic changes involved are discussed. The utility of the mutants in breeding is being explored.

- 135 Seshadri, C. R. & Varisai Muhammad, S. *Maintenance of purity and vigour in castor.* (pp. 102-08).

An isolation distance of at least 200 yards proved to be effective in preventing contamination by other strains. A procedure of single-plant selection and progeny testing for the upgrading of a strain with respect to yield is described.

- 136 Gopalan Nayar, T. *An inter-specific Musa hybrid produced at the Central Banana Research Station, Aduthurai.* (pp. 108-14).

A detailed account is given of the hybrid Monthan x *M. coccinea* already referred to in PBA, Vol. XXIV, Abst. 1449. It is of potential value as a parent for breeding a dwarf wind-resistant type of Monthan.

Proceedings of the Third Scientific Workers' Conference held in the Agricultural College and Research Institute, Coimbatore, on 18 August 1953 (1954): Pp. 118

- 137 Krishnaswamy, N. & Raman, V. S. *S. halepense Pers. and its relationship to the cultivated grain sorghums.* (pp. 58-62).

Collections of *S. halepense* from some localities in Madras State were diploid ($2n = 20$) whereas other collections had $2n = 40$. It is suggested that the diploid form may have arisen by hybridization between the direct progenitor of the *Arundinacea* group and another closely related form which imparted the rhizomatous habit and characteristic leaf shape of *S. halepense*. The tetraploid probably evolved by chromosome doubling in the $2n$ type. Diploid sectors appeared in one 40 -chromosome plant. The diploid form has a higher content of HCN than the tetraploid.

- 138 Sambamurthy, K., Fazlullah Khan, K. & Bettai Gowder, R. *A study of the pollen of some south Indian banana varieties.* (pp. 70-74).

The results of a survey of 40 varieties with respect to pollen production and viability are

reported. Some varieties were male sterile, others were poor producers, while still others were abundant producers of pollen. The pollen of varieties which, according to acetocarmine tests, yielded a high percentage of fertile pollen usually showed a low germination percentage. The variety Chinali had the highest germinability: 6.5%.

- 139 Subramanyam, C. P. *Anthraxnose of Dolichos lablab, Linn.* (pp. 81-86).

It is noted that green varieties of *D. lablab* vars. *typicus* and *lignosus* were susceptible to anthracnose (*Glomerella lindemuthianum*) whereas purple varieties were usually immune. Spores showed no difference in germination in sap extracts from green and purple types.

- 140 Krishnan, C. S. & Neelakantan, L. A note on the trial of Madras Uganda-2 under unirrigated conditions at Periyakulam, Madras State. (pp. 90-95).

Trials have shown that the above strain of Cambodia cotton is suitable for growing under nonirrigated conditions. It has a staple length of 1 in. and spinning value of 40s.

Proceedings of the Fifth Pakistan Science Conference, Lahore, 1953: Part III, Abstracts: Pp. 208.

- 141 Fateh Ali Shah, S. & Siraj-ud-Din Shah, S. *A note on the acclimatization of exotic long-staple cottons in the Punjab.* (pp. 6-7).

Results so far obtained from growing varieties of *Gossypium hirsutum* and *G. barbadense* in different localities in the Punjab are encouraging.

- 142 Siraj-ud-Din Shah, S. *Corolla colour inheritance in American cotton and its association with the economic characters.* (p. 7).

In the variety Delfos, yellow colour of the corolla was monogenically determined and partially dominant to cream. Higher yield and cream-coloured corolla were associated. Corolla and pollen colour were independently inherited.

- 143 Siraj-ud-Din Shah, S. *Inheritance of seed fuzz in the Punjab American cottons.* (pp. 7-8).

The fuzzy condition proved to be dependent on a single dominant gene in 124F x Tidewater, 124F x Express and 199F x Tidewater. It was also monogenically conditioned in 124F x Webber, 199F x Webber, 238F x Webber and 238F x Wilds but was recessive to the naked condition. Dihybrid ratios were obtained in 124F x Wilds and 199F x Wilds, the seminaked character being dominant in the F_1 . Possibly

the inheritance of fuzz is more complex, the genes involved being situated in such close proximity that their aggregate effect is similar to that of a single major gene.

- 144 *Siraj-ud-Din, S. Pollen colour inheritance and its association with the economic characters in Gossypium hirsutum. (pp. 8-10).*

Pollen colour in Delfos was controlled by a single pair of genes, yellow being dominant to cream. Pollen colour showed no association with yield, ginning percentage or staple length.

- 145 *Abdul Hameed Khan & Stroman, G. N. Breeding of cotton varieties for higher grades. (pp. 10-11).*

Breeding for higher grade in the USA is briefly described.

- 146 *Abdul Hameed Khan & Stroman, G. N. Breeding of cotton varieties adaptable to complete mechanization. (pp. 11-12).*

The characters required for suitability for mechanical picking are discussed with reference to cotton production and breeding in the USA. *G. harknessii*, in particular, has been used as a source of the desirable characters.

- 147 *Alam, Z. & Muhammad Abdul Azeez. Natural crossing in some self-fertile forms of oleiferous brassicae cultivated in the Punjab. (pp. 12-13).*

In yellow sarson 12.35% natural crossing occurred, in rai 10.75%. A greater amount of crossing occurred when the plants of the dominant and corresponding recessive types were sown alternately in the same row than when the two types were planted in adjacent rows one foot apart.

- 148 *Alam, Z. & Muhammad Abdul Aziz. Inheritance of some pod-characters in some oleiferous brassicas of the Punjab. (pp. 13-14).*

Capsule habit in sarson was found to be dependent upon a single gene pair (*Aa*), erect capsules being partially dominant to pendent. Number of valves per capsule was also controlled by a single pair of genes (*Vv*), the 2-valved condition being completely dominant to the 4-valved.

- 149 *Alam, Z. & Muhammad Abdul Aziz. Inheritance of flower colour in some self-fertile oleiferous brassicae. (p. 14).*

A new series of multiple factors for flower colour has been discovered in brassicas grown in the Punjab. A factor for light yellow colour, Y_1 , is present in yellow and brown sarson and in

rai. Y_2 , found in sarson, is responsible for yellow colour in the presence of Y_1 but when present alone produces no colour. Y_3 is described as a factor for yellow flowers in rai.

- 150 *Alam, Z. & Muhammad Abdul Aziz. Association of some morphological characters in some self-fertile oleiferous brassicae. (pp. 14-15).*

In investigations on brown and yellow sarson and rai the following genes were independently inherited: *H* for hairiness, Y_1 , Y_2 and Y_3 for flower colour, *A* for capsule habit, *V* for locule number and *Br*₂ and *Br*₃ for seed colour.

- 151 *Alam, Z. & Muhammad Abdul Aziz. A hybrid chimera in brassica. (pp. 15-16).*

In the F_2 of a cross between a white-flowered type of yellow sarson and a yellow-flowered form of toria, a plant occurred in which one branch bore white flowers and the remainder yellow. Breeding behaviour suggested that the white-flowered branch was a combined periclinal and sectorial chimera in which the sporogenous tissue was unaffected, the gene Y_1 for the flower colour being absent from the petal tissue.

- 152 *Yusuf, N. D. & Abdul Azeez Javed. Distinguishing characteristics of some of the improved Co. canes. (pp. 22-23).*

Work on the description of Co. varieties of sugar cane approved for cultivation in the Punjab has been initiated.

- 153 *Yusuf, N. D. & Wali Muhammad. Flowering in sugarcane. (pp. 24-25).*

In the Punjab sugar cane is not known to flower spontaneously. Various methods of inducing flowering are therefore being studied with a view to making breeding possible. Normal arrowing occurred in certain varieties when grown at higher altitudes, some viable pollen being formed. With daily irrigation a number of varieties flowered profusely under field conditions but were sterile.

- 154 *Yusuf, N. D. & Hameed, M. A. Study of the effect of photoperiod on growth in sugarcane. (pp. 25-27).*

Some differences in the photoperiodic responses of the canes Co.312, L29 and Co.453 are noted.

- 155 *Ahmad Mustafa Khan. Sugarcane flowering in Sind. (p. 27).*

Sugar cane flowers freely in southern Sind, but it was observed in a survey of the area that, whereas the ♀ flowers were receptive, the ♂ flowers, although normally developed, bore anthers containing no pollen or only malformed grains.

- 156 *Abdul Ghafoor Bhatti & Ahmed Khan. Study of heterosis in sorghum hybrids. (pp. 27-28).*

The F_1 hybrids T100 x T20 and T100 x Sudan grass showed marked hybrid vigour at the Fodder Research Station, Sargodha, Punjab. The latter cross surpassed the higher-yielding parent in plant weight by as much as 333.9% in spaced plantings. Both hybrids were delayed in maturity.

- 157 *Abdul Ghafur Bhatti & Ghias-ud-Din Ahmad. Some studies on anthesis in sorghums. (pp. 28-29).*

Observations on flowering and anthesis under conditions at the Fodder Breeding Station, Sargodha, are recorded. Bulk emasculation has proved to be satisfactory. Pollen loses its viability after 3 hrs.; stigma receptivity is retained for 24 hrs. Natural crossing in lax-headed types amounted to 15.3-21.6% but to only 1% in a compact type.

- 158 *Zainal Abidin Munshi. Study of a case of linkage in sorghum. (p. 29).*

In the cross between Sayan Perio and Vani 15, colour of the leaf midrib and glume length were each monogenically determined, white midrib being dominant to green and short glume dominant to long. The two genes were linked with a cross-over value of 16%.

- 159 *Abdul Ghafur Bhatti & Ghias-ud-Din Ahmad. Relationship of some important morphological characters with fodder yield in sorghum-Sudan grass hybrids. (pp. 29-30).*

Information is given on simple, partial and multiple correlation coefficients between fodder yield, height, tiller number, stem thickness and other characters in sweet sorghum x Sudan grass hybrids studied at Sargodha. The results of regression analysis indicated that selection for increase in stem thickness should be accompanied by substantial improvement in other yield components.

- 160 *Ahmed Khan & Abdul Ghafoor Bhatti. Floral development, mode of pollination and seed setting studies in berseem. (pp. 30-32).*

As shown by investigations at Sargodha, seed setting is greatly affected by environmental conditions.

When individual flower heads were enclosed in muslin bags, 29.3% of the flowers set seed, setting in the unbagged controls being 49.81%. This difference is regarded as being due to the effect of the bagging. The breeding behaviour of progenies from open-pollinated plants suggested that berseem is chiefly self fertile.

- 161 *Ishaque, M. & Badruddoja, K. M. A comparative study of cultivated varieties of jute and their wild relatives in respect of stem-rot disease development. (p. 54).*

The majority of the varieties of *Corchorus olitorius* and *C. capsularis* tested were classed as highly susceptible or susceptible to stem rot (*Macrophomina phaseoli*), only two varieties of *C. olitorius* falling into the moderately resistant group. *C. acutangulus* and *C. fascicularis* remained free from the disease.

- 162 *Ishaque, M., Talukdar, J. U. & Aziz, A. A comparative study of different varieties of aus and aman paddy in respect of infection by Helminthosporium Oryzae. (p. 56).*

Differences in leaf and grain infection by *H. oryzae* were observed among rice varieties at the Central Agricultural Experiment Station, Tejgaon, Dacca. Varieties showing most resistance may be used in breeding.

- 163 *Ahmad, M. Mating of cells of the same mating type in heterothallic Saccharomyces. (pp. 91-92).*

Cells of *S. cerevisiae* belonging to the same mating type occasionally fused, but without subsequent nuclear fusion.

- 164 *Ahmad, M. The instability of the mating type alleles in Saccharomyces cerevisiae. (p. 92).*

A single-spore + culture lost the capacity to mate. It is suggested that mutation to the - type occurred, followed by fusion of + and - cells to form diploids which gradually replaced the haploids.

- 165 *Ahmad, M. Self-incompatibility in angiosperms and the immunity reaction. (p. 92).*

Pointing out that antibodies are produced in relation to dissimilar proteins, the author expresses the view that the inhibition of pollen in a genetically similar stigma is not likely to involve a reaction of the immunity type.

- 166 *Ahmad, M. Biochemical investigations in Saccharomyces. (p. 92).*

The vitamin requirements of 11 yeast strains are described.

Synthesis of methionine and of pyridoxine each showed dominance over nonsynthesis. One strain of *S. cerevisiae* and another of *S. carlsbergensis*, both requiring pantothenic acid, were unable to synthesize alanine but the hybrid between them was able to do so; it was therefore concluded that two genes were essential for alanine synthesis.

- 167 *Abdur Rashid Mohajir. The inheritance of non-parasitic leaf spots of barley. (pp. 92-93).*

In investigations at the Wisconsin Agricultural Experiment Station, development of non-parasitic leaf spot was dominant over freedom from this condition and depended upon a single gene (*Np*) in crosses of the susceptible barley Abyssinian (CI668) with resistant varieties.

Proceedings of the Sixth Pakistan Science Conference, Karachi, 1954: Part III. Abstracts: Pp. 278.

- 168 *Ahmad Mustafa Khan. Possibilities of sugarcane flowering in Sind. (p. 1).*

Sugar cane was again found to be pollen sterile in southern Sind (cf. Abst. 155).

- 169 *Ghias-ud-Din Ahmed & Abdul Ghaffoor Bhatti. Inheritance of brown grain colour in sorghums. (p. 2).*

In crosses involving the sorghum types 20 and 100 and Sudan grass, brown colour of the grain was controlled by three independent genes, *W*, *B₁* and *B₂*. Neither *B₁* nor *B₂* gives rise to brown colour in the absence of *W*, but when these genes are both present, brown grains are produced, even in *ww* plants.

- 170 *Ghias-ud-Din Ahmed & Abdul Ghaffoor Bhatti. Correlation of different morphological characters with fodder yield in sorghums. (pp. 2-3).*

Further data on Punjab sorghums have again indicated the value of selecting for stem thickness as a means of obtaining improved yield (cf. Abst. 159).

- 171 *Abdul Hameed Khan, Shah, F. A. & Khan, A. R. The ecological adaptation of the cotton varieties in the Upper Thal, Punjab. (pp. 3-4).*

In the above region, characterized by hard red clay, sand and dust storms and extreme temperatures, LSS (*Gossypium hirsutum*) has given the highest yields among the commercial varieties tested. Three reselections of LSS, 320F, 360F and 362F, are earlier maturing than the original variety, which they have outyielded.

- 172 *Abdul Hameed Khan & Vains, M. H. The utility of colloidin in the selfing of cotton flowers. (p. 5).*

Under contitions at Lyallpur, Punjab, application of a colloidin solution to the buds has given complete success in selfing, a solution obtained by dissolving celluloid in acetone in the ratio of 1 : 25 by weight being the most satisfactory.

- 173 *Abdur Rashid Khan & Muhammad Ramzan. Inheritance of some important characters in brinjal (Solanum melongena L.). (pp. 12-14).*

The spiny condition was dominant over smoothness and dependent upon a single gene, *S*. Purple *vs.* green colour of the stem and fruit depended upon one gene pair *Pp*. Besides *p*, another factor, *G*, resulted in green fruits, which were dominant to white; *G* was hypostatic to *P*. The striped *vs.* nonstriped condition in green fruits (*G*) depended upon the gene pair *Aa*. In the presence of both *G* and *P*, *A* was responsible for a mosaic condition of the fruits. Stem thickness was determined by at least three factors and fruit shape by at least five. No linkage was detected between *S*, *P*, *G* and *A*.

- 174 *Abdur Rashid Khan & Din Muhammad. Some inheritance studies in vegetable marrow (Cucurbita pepo L.). (p. 14).*

Inheritance of trailing *vs.* erect habit was digenic, whereas the character pairs trailing *vs.* bushy and bushy *vs.* erect each showed monohybrid segregation. A single pair of genes controlled spotting *vs.* absence of spotting of the leaf. Single-factor differences were detected between the fruit shapes round *vs.* double convex, single convex *vs.* round, and single convex *vs.* long, and two-factor differences between long *vs.* round and single convex *vs.* double convex. Fruit and flesh colour were determined by the same gene.

- 175 *Abdur Rashid Khan & Muhammad Munir. Inheritance studies in the common chillies (Capsicum annum L.). (pp. 14-16).*

It was estimated that leaf size was conditioned by at least five genes. The following genotypes are postulated for anther colour: purple, *AABB* or *AAbb*; blue, *aaBB*; and yellow, *aabb*. Pink and white petal colour segregated with an *F₂* ratio of 9 : 7. A trigenic *F₂* ratio of 57 pink *vs.* 7 white was obtained for filament and style colour, as the result, it is suggested, of the interaction of the two complementary genes for petal colour and a third gene. Node and anther colour were associated. Pendent *vs.* erect position of the fruits depended upon one gene pair; in two crosses, pendent position was completely dominant but in others partially dominant. Red colour of the mature fruits was dominant over yellow and monogenically determined, seed colour being controlled by the same gene. Inheritance of pungency *vs.* nonpungency was probably monofactorial. Calyx behaviour and the fruit characters studied were all

independently inherited. Calyx shape was associated with fruit size with a crossing-over value of 18%, thin fruits usually having the enclosing type of calyx.

- 176 *Abdur Rashid Khan & Muhammad Azim Bajwa. Some inheritance studies in muskmelon (Cucumis melo L.). (pp. 16-17).*

Colour, specking and ribbing of the fruit were each monogenically determined, yellow skin being dominant over yellowish-green, whitish-yellow skin over creamy white, specking over absence of specks, and ribbed surface dominant over nonribbed. Round fruit shape was dominant and dependent upon two gene pairs; when one or other of these was recessive, oval or triangular shape resulted. Pink flesh was also dominant and dependent upon two pairs of genes, green or white flesh being produced when one or other of these pairs was recessive. Monecy was simply inherited and dominant over andromonecy. Round shape was associated with whitish-yellow skin, oval shape with creamy-white skin and specking with absence of ribbing.

- 177 *Sardar Khan. Nursery stock of wheats in the Punjab (Pakistan). (pp. 17-18).*

Foreign introductions and types obtained by intercrossing local varieties of *Triticum vulgare* are maintained at the Agricultural Research Institute, Lyallpur. Konozo is the earliest flowering wheat in the collection, taking 50 days from sowing, in contrast to the earliest flowering Punjab wheats which take 110 days.

- 178 *Abdul Hameed Khan, Muhammad Shuaib & Muhammad Siraj-ud-Din. Petal spot investigations in American cottons in the Punjab. (p. 18).*

A brownish petal spot has been recorded in several varieties of *Gossypium hirsutum* and is now being investigated genetically.

- 179 *Wali Muhammad & Yusuf, N. D. Response of some of the new varieties of sugarcane to different conditions of manure and irrigation. (p. 23).*

Differences in the responses of L5, L9, L29 and K30 to N manure and irrigation are noted: these varieties were developed at the sugarcane Research Station, Lyallpur.

- 180 *Abdul Latif & Muhammad Akhtar, M. Susceptibility of some new varieties of sugarcane to the attack of borers. (pp. 46-47).*

Only one variety, K30, was less severely attacked than the standard Co. 312 but the difference was not significant.

- 181 *Abdur Rahim Chawdhary. Some studies on physiological specialization in bunt of wheat. (p. 72).*

Collections of *Tilletia tritici* and *T. laevis* from Pakistan and Bharat consisted of 35 physiological races.

- 182 *Obedur Rehman Khan & Wilcox, A. N. Vegetative vigour in strawberry in relation to methods of breeding: a comparison of the self and cross progenies from several selected inbred clones and from the varieties from which they were derived. (pp. 78-79).*

In experiments at the University of Minnesota, vigour was studied in the selfed and top-crossed progenies of 11 parents, viz. Marshall and five clones derived from it through one to three generations of selfing, and Dunlop and four clones descended from it through one or two generations of selfing. Selection of the clones had been primarily for fruit type, only secondarily for vigour. Premier formed the top-cross parent. The selfed progenies of all 11 parents differed significantly in vigour. The S_1 vigour of the parental varieties bore no relationship to the vigour of the selfed selections or top crosses.

- 183 *Fazlur Rahim Khan, Mohammad Sulyman & Akhtar Munir. Potentialities of introducing hybrid maize in N.-W.F. province. (p. 90).*

Some American hybrids exhibited promise in preliminary tests in the North-West Frontier Province.

- 184 *Sardar Khan. Effect of transplanting time on some quantitative characters of rice in the Punjab (Pakistan). (pp. 92-94).*

Varietal differences in response to time of transplantation, as expressed in plant height, panicle length, straw yield and grain weight and size, are reported.

- 185 *Sardar Khan. Photoperiod response in rice in the Punjab. (pp. 94-95).*

The five Punjab varieties tested were highly sensitive in their photoperiodic response, behaving as short-day plants. Toga and Bara gave particularly marked reactions. The five varieties differed in their response to date of sowing, suggesting differences in sensitivity to temperature.

- 186 *Ghulam Mahboob. Studies on hybrid vigour in maize (Zea mays L.). (pp. 95-96).*

In the North-West Frontier Province, F_1 intervarietal hybrids have exhibited heterosis in

several characters, 18-33% improvement in yield being obtained.

- 187 *Abdus Sattar & Abdul Ghani Arif.* Some further studies on the control of blight disease of gram by resistant types. (p. 96).

Breeding for blight resistance at Lyallpur is outlined (cf. *PBA*, Vol. XXIV, Absts. 923-5). The variety C612, resistant to blight and also tolerant of wilt, has recently been released (cf. *PBA*, Vol. XXV, Abst. 2540).

- 188 *Nawaz, S. M.* The importance of spinning tests in the cotton breeding programme. (p. 98).

The importance of microspinning tests in breeding for fibre quality is stressed and the establishment of a central institute for carrying out such tests in Pakistan is advocated.

- 189 *Abdul Hameed Khan, Siraj-ud-Din Shah & Wali Muhammad.* Place effect on the yield of American cotton in the Punjab. I. Commercial varieties. (pp. 102-03).

The results of trials of *G. hirsutum* cottons, such as LSS, 238F or 199F, have indicated that varieties differ markedly in their performance according to region.

- 190 *Abdul Hameed Khan, Muhammad Shafi & Muhammad Siraj-ud-Din.* Place effect on the yield of American cotton in the Punjab. II. Lasani cottons. (p. 103).

Lasani cottons consist of types developed from crosses of local commercial varieties with introductions; they have a staple length of $1\frac{1}{8}$ to 1.20 in. and are capable of spinning 50 to 70's. Lasani 5, 11, 12 and 15 have shown most promise and are to be further tested in different areas.

- 191 *Abdul Hameed Khan.* Breeding of early maturing varieties of cotton. (pp. 103-05).

The new varieties 320F and 360F are earlier maturing and higher yielding than LSS and have proved to be particularly suitable for water-logged areas in the Punjab.

- 192 *Abdul Hameed Khan, Vains, M. H. & Muhammad Shuaib.* The varietal resistance of American cotton to tirak in the Punjab. (pp. 105-06).

Sources of resistance to the physiological disease tirak have been found among the breeding material at Lyallpur. G26, Webber, selections of 238F and 238F x 216F, and derivatives of BAR NT 96 x 124F, BAR NT 96 x 393F and 268F x Acala 4-42, in particular, have shown a high degree of resistance.

- 193 *Sardar Khan.* Inheritance of some characters in rice in the Punjab (Pakistan). I. The inheritance of anthocyanin pigment in leaf-sheath, leaf-blade and stigma. (pp. 106-07).

Purple leaf sheath was dominant to green and dependent upon a single factor, *Ls*. Leaf-blade colour was determined by *Ls* and a gene (*H*) inhibiting pigment production, an F_2 ratio of 3 : 13 being obtained for purple and green leaved plants. Purple stigma, dominant over white, was conditioned by a single gene, *St*, linked with *Ls* with a cross-over value of $2.91 \pm 1.03\%$.

- 194 *Majeed Ahmad, Chaudhury, A. R. & Ahmad, K. U.* Studies on toddy yeast. (pp. 118-19).

The biochemical and genetical behaviour of strains of *Schizosaccharomyces pombe*, *Saccharomyces chevalieri* and *Saccharomyces ludwigii* is described (cf. *PBA*, Vol. XXV, Abst. 1626).

- 195 *Majeed Ahmad & Abdul Azeez Khan.* Genetics of yeast. (p. 119).

"Three hybrids IA, IIF and IJJ, heterozygous for five loci are reported. Synthesis of an enzyme for fermentation or a member of vitamin B complex is seen to be dominant over non-synthesis. Segregations for mating-type locus are seen to be regular. 2 : 2 segregations for galactozymase are seen in hybrid IIF. Segregations for galactozymase in the other two hybrids and for the syntheses of pantothenic acid, inositol, and thiamin are found to be irregular in all the three hybrids. Hybrids IIF and IJJ come from the same haploid parents but IIF shows a monohybrid while IJJ a possibly dihybrid ratio for galactozymase. This is explained by assuming that one of the galactozymase synthesiser alleles mutated to non-synthesiser in IIF.

"Amongst the aberrant segregations only 3 : 1 class has been found. No 1 : 3 or 0 : 4 case has come to light for any character from the three hybrids. The irregular ratios seen in the three hybrids have been explained on the basis of polymery."

- 196 *Majeed Ahmad & Abdul Azeez Khan.* Studies on baker's yeast of East Pakistan. (pp. 119-20).

Information is given on the biochemical behaviour of 79 strains of *Saccharomyces carlsbergensis*, *S. cerevisiae* var. *ellipsoideus* and other yeasts. One strain of *S. cerevisiae* var. *ellipsoideus* appeared to be basically heterothallic; in the five strains of *S. carlsbergensis* studied heterothallism was well-defined. Heterozygosity for

various nutritional requirements and fermentative capacities occurred among the six strains.

- 197 *Majeed Ahmad & Abdul Azeez Khan. Polygametic zygotes as a source of polyploidy and irregular ratios in yeast. (p. 120)*

Two trigametic zygotes were isolated from a cross between single-spore cultures. It is suggested that the formation of polygametic zygotes may be a cause of irregular segregations.

- 198 *Muhammad Akhtar Sheikh & Mohajir, A. R. A study on the introduction of polyploidy in gram (Cicer arietinum L.). (pp. 124-25).*

Treatment of the seeds with 0.1 colchicine solution for 24 hrs. was the most successful method. The polyploids exhibited gigas characters and were reduced in fertility.

- 199 *VALDEYRON, G. Rapport sur les travaux de recherche effectués en 1953. (Report on research projects carried out in 1953). Ann. Serv. bot. Tunis 1952 : 25 : Suppl. : 1-34.*

The results of trials of indigenous and introduced varieties of cereals, flax, leguminous crops, cotton, rice and fruit trees are reported. Particular attention is being paid to the breeding of new varieties of wheat and crosses have been carried out between American and local varieties to obtain a high-yielding hard wheat adapted to Tunisian conditions and with flour of good baking quality. Among crosses carried out between soft wheats, (Florence x Aurore [Dawn]) x Étoile de Choisy [Choisy Star] gave high yields, especially under conditions of heavy rainfall. Breeding for resistance to rust continues and the search for varieties of soft wheat that meet Tunisian requirements is being intensified. Varietal differences among grapes in resistance to downy mildew are noted. Beldi x Ugni blanc 3614 [White Ugni 3614] and Fiano, a grape used for making red wine, proved highly productive.

- 200 *Annual Report of the Research Division of the Sudan Government Ministry of Agriculture, 1951/52 (1954) : Pp. 191.*

A report on cotton breeding at the Gezira, Shambat and Kadugli stations has already been summarized in *PBA*, Vol. XXV, Absts. 1227-9. In addition to brief reports of varietal trials of groundnuts and sunflower and tests of varieties

of *Dolichos lablab* for resistance to *Xanthomonas phaseoli*, the following work is described:—

Sorghum. Selection for grain quality and high yield has been carried out in 11 varieties. Emasculation techniques are described.

Sesame. Selection for resistance to shattering and for other desirable characters has been carried out in the F_3 and F_4 generations of a cross between Langham's nonshattering mutant and an American variety. The extent to which natural cross pollination occurs is under investigation.

- 201 *Annual Report of the Department of Agriculture of the Federation of Nigeria for the year 1952-53 (1955) : Pt. II : Pp. 47.*

Investigations in the northern region included the following:—

Sorghum. Nigerian varieties were crossed with American introductions.

Cotton. Selections of Samaru 26C were tested (cf. *PBA*, Vol. XXV, Abst. 1232).

Sesame. Progress is reported in selection, the two main objectives of which are high yield and early maturity.

Groundnut. Selection continued.

The following activities were among those carried out in the south:—

Maize. Selfing of the varieties Tsolo and Lagos White continued, the best S_1 lines of Tsolo being combined into a synthetic. Of the rust-resistant material available for breeding, the lines Mexico 16 and 17 appear to be the most resistant.

Cacao. Seedlings from crosses of the Nigerian selection T38 with the high yielding Trinidad seedlings T1, T2 and T3 continued to give high yields in the tenth year since planting.

Kola. As a result of individual-tree recording, selection of high yielding trees of good quality should shortly be possible.

The following work was carried out in the breeding programme of the Maize Rust Research Unit:—

F_1 hybrids between the varieties White Tuxpan and American Bounty, which have been selected under Nigerian conditions for four generations, and resistant selections of material received from the Rockefeller Institute, Mexico, are now undergoing primary yield tests. In the presence of rust, although partially susceptible, the two above-mentioned varieties have produced twice the yields of local maize. Preliminary yield trials are being carried out on S_2 lines intended for use in hybrids and synthetics. Further tests have confirmed previous observations that a high degree of rust resistance is to be found in

maize from Central America and the Caribbean area.

202 Annual Report of the Colony and Protectorate of Kenya Department of Agriculture 1954 (1955) : Pp. 78.

In addition to trials of sorghum, grasses, legumes, cotton, coffee and other crops the following work has been carried out:—

Pyrethrum. A number of clones showing promise for further breeding have been selected. The varieties C43, C51, C79 and M9 continued to do well (cf. *PBA*, Vol. XXV, Abst. 1708). Problems of pollination are under investigation.

Wheat. The presence of the stem rusts K13 and K14 in Kenya has been confirmed. Introduced varieties are being used as sources of rust resistance. Both pedigree and bulk selection methods have been used in breeding.

Maize. A new synthetic has been developed at Njoro. At Kitale, trials of top crosses were held with a view to determining lines suitable for building up synthetics. Breeding for local adaptation and resistance to *Puccinia polysora* continued in the Coast Province.

Barley. Crosses made in 1953 were advanced to the F₂ stage by the end of 1954.

Sugar. In the Kibos Miwani area, several varieties have outyielded Co.421, the best in recent trials being the Co. varieties 331, 213, 419 and 409.

203 RATTRAY, A. G. H. Agricultural Experiment Station, Salisbury. Annual report of experiments, season 1953-54.

Rhod. agric. J. 1955 : 52 : 246-61.

Trials were carried out on varieties of maize, potato, velvet bean, cowpea and soya bean. Hybrids of maize have in general outyielded open-pollinated varieties. The potato Pentland Ace, introduced from the United Kingdom, has exhibited good resistance to late blight.

204 Annual Report of the Director, Experimental Farms Service, Department of Agriculture, Ottawa, Canada, 1953-1954 : Pp. 43.

In addition to researches on wheat, buckwheat, oats, barley, tobacco, safflower, fruits, musk melon, tomato and tobacco, already summarized in *PBA*, Vol. XXV, Abst. 1711, the following work is reported:—

Wheat. Ottawa 3909, a soft white winter wheat hybrid with resistance to leaf rust, has given high yields for the past two years at Harrow, Ont.

Oats. Of more than 100 varieties tested at five stations in eastern Canada for reaction to

Septoria avenae, four noncommercial varieties of *Avena sativa* and seven varieties of wild species showed resistance in all localities.

Barley. N-C13-13, a selection made at Nappan, NS, from an American composite cross, has shown good resistance to *Harmolita hordei*. Several sources of resistance to *Helminthosporium sativum* have been found.

Flax. A new variety, Raja, is to be released in 1955 (cf. *PBA*, Vol. XXV, Abst. 1712). Among five varieties studied, a lower relative growth rate was found in late-flowering than in earlier-flowering varieties. Intervarietal differences in relative rate of height increase but not in relative rate of dry weight increase were also observed. Weight of seed was not associated with rate of increase in height.

Safflower. Introductions from India show promise in respect of early maturity and high oil content.

Annual meeting and convention of the Agricultural Institute of Canada, University of Alberta, Edmonton, June 20th-June 23rd.

Agric. Inst. Rev. 1955 : 10 : No. 3 : 29-44. (Absts.).

205 Dickson, G. H. Plum breeding, 1913 to 1937. (p. 34).

Breeding at the Horticultural Experiment Station, Ont., has the main objective of developing a seasonal succession of high-quality plums of the prune type, with emphasis on late-season varieties for export. Promising seedlings are under test.

206 Lapins, K. O., Mann, A. J. & Keane, F. W. L. Progeny analysis of some apricot crosses. (p. 34).

In investigations on the progenies of 13 crosses at Summerland, BC, correlation coefficients between the average scores of the parents and their seedlings with respect to fruit size, fruit firmness, freedom of stone and quality were +0.831, +0.892, +0.823 and +0.749 respectively. The following varieties affected their progeny favourably in the characteristics listed: Blenheim, quality; Hemskirke, freedom of stone, quality and size; L-105 (McClure), quality, freedom of stone and frost hardiness; Old Moorpark, quality and size; Perfection, freedom of stone and size; Reliable, firmness, freedom of stone and frost hardiness; and Tilton, fruit quality, but unfavourably with respect to freedom of stone and size. Reliable was outstandingly good as a parent in crosses with Old Moorpark or Hemskirke, in producing

seedlings combining frost resistance, firmness and good quality.

207 *Graham, T. O. Rhubarb plant improvement under Canadian methods. (p. 35).*

Past and present breeding was surveyed and varieties in Canada were classified.

208 *Bolton, J. L. Breeding and maintaining varieties of perennial forage crops. (p. 40).*

Among the general points commented upon is the fact that varieties may change rapidly and often disadvantageously according to the environmental conditions. The original clones of synthetics should therefore be maintained so that the varieties can be reconstituted if necessary.

209 *Gardner, A. C. Climatic phenomena affecting the growth and development of certain varieties of annual cereals grown at two diverse latitudes. (p. 40).*

The growth and phenology of ten (unspecified) varieties of cereals grown during two seasons at Madison, Wis., and Beaverlodge, Alta., were studied in relation to various meteorological conditions.

210 *Knowles, R. P. Heritability estimates in perennial grasses. (p. 41).*

"Estimates of heritability for various agronomic characters were made in perennial grasses by doubling the regressions of open-pollination progenies on parent clones. Heritability appeared high for the degree of creeping in brome grass and intermediate wheat grass, degree of aphid damage in crested wheat grass, and leaf-spot damage in brome grass. Forage yield was intermediate in heritability in all three grasses. Heritability of seed yield in brome grass was low. These results emphasize the opportunity of selection for certain characters on the basis of clonal performance without progeny testing."

211 *Anderson, R. G. & Knott, D. R. Inheritance of stem rust reaction in some wheat varieties. (p. 41).*

The following information was obtained at Saskatchewan University on inheritance of resistance to race 56. Red Egyptian and Kenya 58 had one factor in common; the former variety also possessed two or three other factors. In Kenya 117A resistance depended upon two genes, one or both of which were also carried by Egypt Na95. Lee, Gabo and Timstein had factors in common, presumably the two complementary factors on chromosome X in Timstein.

The gene in Kenya 58 and Red Egyptian, or one in close linkage with it, also conferred resistance to race 15B. Kenya 58, however, carried an additional gene for resistance to this race. The second gene was present in Egypt Na95 and Kenya 117A, in which it was solely responsible for resistance to 15B. Red Egyptian contained two or three other factors for resistance to the last-mentioned race, one of which may have resulted in resistance to both races.

212 *Putt, E. D. & Sackston, W. E. Rust resistance in sunflowers, Helianthus annuus L. (p. 41).*

Resistance to rust (*Puccinia helianthi*) has been discovered in three introductions: open-pollinated seed of the variety Hopi and natural crosses of Sunrise and California Oilseed with Texas Wild Annual. In each case resistance was found initially in a single plant. Sunrise x Texas Wild Annual has been used in breeding the resistant variety Beacon. The introductions all originated from the vicinity of Renner, Tex. It is suggested that the wild annual sunflower of this region may serve as a source of genes for resistance.

213 *Putt, E. D. & Rojas, E. Field studies on the inheritance of resistance to rust in the cultivated sunflower, Helianthus annuus L. (p. 41).*

In crosses of three lines differing in their degree of susceptibility with the resistant line 953-102-1-1-22, selected from the natural cross California Oilseed x Texas Wild Annual, rust resistance was dominant and monofactorial.

214 **Investigations 1953.**

Bull. Dep. Agric. Jamaica 1953: No. 53: Pp. 163.

Banana. The variety 1071(117) has replaced (1071)10 as chief 2n ♂ parent (cf. *PBA*, Vol. XXIV, Abst. 937). Nineteen new seedlings showed promise when tested for resistance to Panama disease and are to be included in field trials.

Other crops. Selection of cashew nut and coffee continued. Variety trials were carried out on cereals, root crops, cacao, castor bean, oil palm and several other crops.

215 **Fourth Annual Progress Report of the Oficina de Estudios Especiales, Mexico, September 1, 1953-August 31, 1954: Pp. 151. (Mimeographed).**

Wheat. Stem-rust races 15B, 49, 139, 29 and 48 are now serious threats to commercial varieties in use at present. The following varieties, resistant to some or all of these races, as well

as to those formerly prevalent, are being multiplied for distribution: Chapingo 52, Chapingo 53, Bajfo and Mexe (all derived from Yaqui x Kentana), Cajeme 54, Yaqui 53, Mayo 54, Gabo 54, Sinaloa, Kentana x Rio Negro, Lerma Rojo and Kentana x Cinco [Five].

Composite varieties consisting of a mechanical mixture of a number of lines, phenotypically similar but genotypically dissimilar with respect to rust resistance, are being developed. The component lines are being bred by back-crossing.

Maize. Experimental and commercial hybrids were tested for yield in comparison with open-pollinated varieties under irrigated or non-irrigated conditions in the Mesa Central, Bajfo and tropical regions. The new hybrid Rocamex H-124 is to be increased and distributed by the National Corn Commission; a very early-maturing type, it is especially adapted to the high altitudes of the Toluca Valley. Synthetics are being developed for those areas where rainfall is scarce and where the use of hybrids is not yet recommended. Breeding hybrids for tropical conditions is centred at San Rafael, Veracruz. Three hybrids have been developed, H-502, H501 and H-503, of which the last two show promise for both the west and east coasts.

The Central American Cooperative Corn Project came into operation in 1954 with the immediate objective of collaboration in testing varieties and hybrids already available in the member countries and with the long-term aim of promoting and coordinating breeding and production by means of a central agency.

Participation in the international project for the preservation of indigenous races continued.

Potato. Seedlings submitted by breeders in North America and several European countries were tested under field conditions for late-blight resistance in the valley of Toluca where highly variable strains of the pathogen are prevalent. The so-called major genes of *Solanum demissum* for resistance, whether single or in combination, do not give high levels of resistance in Mexico. Partial or field resistance may however be sufficiently high to render spraying unnecessary, such resistance depending upon many minor genes. Breeding for a late-blight resistant commercial variety has been initiated at Toluca.

Capsicum. Selection of local pepper has resulted in a semihot stuffing type, well-adapted to the Mesa Central region.

Cucumber. The development of a variety for the tropical regions of Veracruz, possessing the vigour and disease resistance of Hodai with the high quality of nonadapted types, is under way.

Tomato. Several lines show promise as material from which to develop a variety for Veracruz. At the Jaloxtoc station, Morelos, breeding is in progress to produce improved varieties with good transportability. Lines from crosses of wild Mexican collections and cultivated types were selected. Selections made at Jaloxtoc, in the absence of late-blight attack, are undergoing tests for resistance to this disease at Chapingo.

Bean. Testing of local and foreign varieties and of segregating and pure lines in various regions continued. Over 50% of the crosses so far effected have the Mexican variety Canario as one parent; a combination of the good quality and other desirable characters of Canario with higher yielding capacity and root-rot resistance is desired. A large number of varieties are being tested for reaction to rust and crosses have been made to investigate the genetics of resistance to this disease. Work on the classification of beans in Mexico has been initiated.

LUCAS, G. B.

Report and abstracts of the 1955 annual meeting of the southern division of the American Phytopathological Society.

Phytopathology 1955 : 45 : 346-50.

At the above meeting, held jointly with the 52nd annual convention of the Association of Southern Agricultural Workers at Louisville, Kentucky, the following papers of interest to breeders were presented, in addition to those summarized from another source (cf. Absts. 228, 230-1 and 233).

216 *Crittenden, H. W. Root knot nematode resistance of soybeans. (p. 347). (Abst.).*

Of 50 varieties tested in Delaware for resistance to *Meloidogyne incognita* var. *acrita*, the following were the most resistant: Laredo, Mukden, Anderson, Monroe, Blackhawk, Peking, Mendota, Haberlandt, Habaro and Mandarin 507. The first five of these were tested for resistance to *M. hapla* and proved to be susceptible.

217 *Martin, W. J., Newsom, L. D. & Jones, J. E. Relationship of nematodes of the genera Meloidogyne, Tylenchorhynchus, Helicotylenchus, and Trichodorus to the development of Fusarium wilt in cotton. (p. 349). (Abst.).*

Of the four nematodes *M. incognita* var. *acrita*, *Tylenchorhynchus* sp., *Helicotylenchus* sp. and *Trichodorus* sp., all of which attacked the cotton varieties Deltapine 15 and Coker 100WR, only

the first significantly increased the incidence of *F. oxysporum* var. *vasinfectum*.

Proceedings, abstracts of papers and addresses of the 52nd Annual Convention of the Association of Southern Agricultural Workers, held in Louisville, Kentucky, February 7, 8, 9 1955 : Pp. 208.

218 Coleman, O. H. *The heritability of a dry segregate in sorgo.* (p. 35).

A variant with dry stalks and white midribs appeared in the sorgo Honey. Its characteristics proved to be dependent upon a single mutation *D*, dominant to *d* for juicy stalks and dull midribs. Only about 60% as much juice was extracted from the dry type as from the normal.

219 Horner, E. S., Hull, F. H., Chapman, W. H. & Lundy, H. W. *Progress report on recurrent selection for specific combining ability in corn.* (pp. 36-37).

At the University of Florida, the single cross F44-F6 has been subjected to recurrent selection for specific combining according to the method proposed by Hull (cf. *PBA*, Vol. XV, Abst. 996). Expressed as percentages the yields of the standard hybrid Dixie 18, the mean yields of all test crosses in the first, second and third cycles were 93, 95 and 107% respectively, the mean yields of the selected test crosses in the first, second and third cycles being 106, 109 and 122% respectively. Further progress in raising yield is expected in the fourth cycle.

220 Gregory, W. C. *The use of X-rays in the breeding of peanuts.* (pp. 37-38).

Mutants with several valuable economic characters have been induced (cf. *PBA*, Vol. XXV, Abst. 1731).

221 Yarnell, S. H. *Segregation for plant size in cabbage.* (p. 113).

Dwarf plants comprised approximately 2% of the populations of 153 commercial and experimental lines studied at the USDA Southeastern Vegetable Breeding Laboratory, Charleston, SC. Their breeding behaviour when selfed or intercrossed varied considerably, showing that the dwarf plants were genetically diverse. Appropriate crosses indicated that the proportion of dwarf and large plants in F_3 populations was determined by (1) similar genes in the two parents, (2) complementary genes or (3) new combinations of genes which were responsible for a high proportion of dwarfs in one cross but a high proportion of large plants in other crosses.

222 Mikell, J. J., Hernandez, T. P. & Miller, J. C. *Preliminary studies on the inheritance of skin and flesh color of the sweet potato.* (pp. 113-14).

Complementary factors may condition skin and flesh colour.

223 Lam, S.-L. & Cordner, H. B. *A flower inducing substance in relation to blooming of sweet potato plants.* (p. 114).

These investigations on the induction of flowering by grafting have already been referred to in *PBA*, Vol. XXV, Abst. 2192.

224 Greenleaf, W. H. *Inheritance of resistance to tobacco-etich virus in peppers.* (p. 115).

Resistance in the variety South Carolina 46252 to the above disease is probably of a klendusic nature whereas resistance in *Capsicum frutescens* 'PI 152225' is of the masked carrier type. Resistance in each case is recessive and monogenic.

225 Harmon, S. A. & Rankin, H. W. *Response of sweet potato varieties to inoculation with Fusarium batatatis Woll. and F. hyperoxysporum Woll.* (pp. 115-16).

The following varieties and seedlings were classified as resistant: Pelican Processor, Triumph, White Star, Tinian, Goldrush, Easter, HM-120, 1-2 x 36-18 and 1-36 x 49-5. In the F_1 of the susceptible variety Unit I Porto Rico x Tinian, 57% of the plants showed marked resistance, 18% possessed some tolerance and 25% were susceptible.

226 King, J. R. *Pollen storage studies on Irish potatoes.* (p. 122).

Experiments carried out on pollen storage for short and long periods in connexion with breeding at the Louisiana State University are described (cf. *PBA*, Vol. XXV, Abst. 2162). Longevity has proved to be highest when the pollen is stored at 30° F. at a relative humidity of 18%.

227 Downs, R. J. & Piringer, A. A. *Photoperiodic responses of strawberries.* (pp. 122-23).

In experiments at the University of Minnesota, flower buds in June-bearing varieties were initiated under short-day conditions but with long-day treatment their formation was inhibited; runner production was inhibited by short days but stimulated by long days. In ever-bearing varieties, initiation of flower primordia occurred under all photoperiodic conditions, abundant flower clusters being formed with photoperiods of 15 and 17 hours. Very few runners were developed under long or short day

conditions. Varietal differences in amount of fasciation were observed, fasciation only appearing in plants receiving photoperiods of 13 hours or less.

- 228 Heggstad, H. E. Burley, flue-cured and cigar wrapper varieties compared in resistance to black shank and Fusarium wilt. (p. 145).

The varieties Burley 11A and Burley 11B (cf. *PBA*, Vol. XXIV, Abst. 3215) were more resistant to black shank than the six flue-cured varieties studied but less resistant than the cigar wrapper tobaccos Dixie Shade and RG in tests at the Tobacco Experiment Station, Greenville, Tenn. When tested with several isolates of *Fusarium oxysporum* var. *nicotianae* Burley 11A, Burley 11B and Kentucky 35 showed 42%, 62% and 16% plant survival respectively; the flue-cured cigar-wrapper varieties were equal to or superior to Burley 11A in wilt resistance.

- 229 Heggstad, H. E. & Clayton, E. E. Development of Burley varieties resistant to black shank, Fusarium wilt, wildfire, tobacco mosaic and black root-rot. (pp. 145-46).

Some advances in breeding for disease resistance at the Tobacco Experiment Station, Greenville, Tenn., are described. The recently developed varieties Burley 11A and Burley 11B are stated to possess resistance to blackshank, black root rot and *Fusarium* wilt (cf. Abst. 228). The variety Burley 21, combining resistance to wildfire, mosaic and black root rot, has also been bred. Its wildfire resistance has been derived from *Nicotiana longiflora* and its mosaic resistance from *N. glutinosa*. In yield and quality Burley 21 compares favourably with commercial varieties.

- 230 Moore, E. L., Drolsom, P. N. & Clayton, E. E. High black shank resistance and tolerance to parasitic nematodes in flue-cured tobacco. (p. 146).

In North Carolina the blackshank-resistant variety Dixie Bright 101 (cf. *PBA*, Vol. XX, Abst. 2514) has shown susceptibility to *Meloidogyne* and *Pratylenchus*, with a concomitant increase in susceptibility to blackshank. By crossing Dixie Bright 102, a variety highly resistant to blackshank, with Hicks or Bottom's Special, and crossing the F_2 to Dixie Bright 101, F_5 and F_6 lines have been obtained with greater resistance to this disease than the present commercial varieties. In yield and quality the lines are superior to Dixie Bright 101 on disease-free soil and are vigorous in the presence of the above-mentioned nematodes.

- 231 Apple, J. L. Pathogenic variation among single zoospore isolates of *Phytophthora parasitica* var. *nicotianae*. (p. 147).

Single-zoospore isolates from a four-year-old culture which had shown alteration in its pathogenicity on tobacco since it was first isolated varied widely in pathogenicity. This variation probably arose through mutation during culture.

- 232 Hare, W. W. Resistance to *Cercospora* in pepper. (p. 148).

Four small-fruited peppers of the hot type from Brazil and Puerto Rico have exhibited a high degree of resistance to *C. capsici* in tests at the Mississippi Agricultural Experiment Station.

- 233 Hare, W. W. Resistance to *Fusarium* wilt in Brown Sugar Crowder cowpeas. (p. 148).

In contrast to its susceptible parent, selection S-1 of Brown Sugar Crowder, developed at the Mississippi Agricultural Experiment Station, is highly resistant to race 1 and also tolerant of races 2 and 3 of *F. oxysporum* f. *tracheiphilum*. It shows however less tolerance of race 3 than of race 2.

- 234 Bird, L. S. The relation between carbohydrates and soluble nitrogen combination on the resistance of cotton to the bacterial blight disease. (pp. 151-52).

As previously reported, reaction to bacterial blight depends upon a genetically determined physiological balance affecting the carbohydrate-nitrogen ratio in the leaves (cf. *PBA*, Vol. XXV, Abst. 1250).

- 235 Burton, G. W. Breeding for disease resistance in grassland crops. (pp. 188-89).

Grass breeding for disease resistance is discussed in a general manner; the importance of testing segregating populations with as many biotypes of a pathogen as possible is stressed.

- 236 Taylor, N. L. Screening for leafhopper resistance in alfalfa. (p. 190).

Methods successfully used for evaluating lucerne plants for reaction to leafhopper (*Empoasca fabae*) under field and greenhouse conditions at the New York State Agricultural Experiment Station are outlined.

- 237 Report of the Director of the New Hampshire Agricultural Experiment Station, July 1, 1952, to June 30, 1953.

Sta. Bull. Univ. NH 1954 : No. 409 : Pp. 40.

Report of the Director of the New Hampshire Agricultural Experiment Station, July 1, 1953, to June 30, 1954.

Sta. Bull. Univ. NH 1955 : No. 418 : Pp. 48.

Oats. On account of its higher yielding capacity, Clarion [CI5647 (Clinton x Marion)] has been released as a substitute for Clinton.

Smooth brome grass. Breeding included the establishment of a polycross nursery, selection for resistance to brown leaf spot and investigation of the correlations of leafiness with other characters. About 15 species of *Bromus*, chiefly from South America, are to be studied as possible sources of valuable characters.

Ladino clover. Plants promising with respect to hardiness, recovery after disease attack and other characters were selected for progeny testing. Possible associations of persistence with morphological characters are to be determined.

Potato. The variety Merrimac has been developed (cf. *PBA*, Vol. XXV, Abst. 3204).

Peach. The hardy selection W1 (North Caucasus x Eclipse) has been distributed for trial; it is a yellow freestone type.

Rubus. Named raspberry and blackberry varieties were crossed with *R. pungens*, *R. morifolius*, *R. chamaemorus*, *R. odoratus*, *R. pubescens*, *R. arcticus* and *R. canadensis*.

The red raspberry New Hampshire originated from Taylor x *R. chamaemorus*. It has a longer fruiting period than most commercial varieties and has displayed a high degree of winter hardiness.

Strawberry. Selections F-2 and F-13 [NH179 (Tupper x Fairfax) x Fairpeake] have been distributed for growers' trials; they ripen ten days later than Howard 17.

Castanea. F₁ hybrids from a cross between a hardy tree of *C. crenata* and *C. dentata* and back-cross seedlings to *C. crenata* are under observation.

Tomato. Progress has been made in breeding for late blight resistance.

Doublerich has been produced from a cross between cultivated tomato and a wild Peruvian variety; it possesses resistance to cracking and high vitamin C content (cf. *PBA*, Vol. XXIII, Abst. 1809).

The new Red Pickler variety is a determinate type with pear-shaped fruits. It sets many green fruits at the same time, so that harvesting can be accomplished by pulling up the plant and shaking.

Beans. A shell-bean variety, Scarlet Beauty,

with large bright red beans, has been developed. Varieties adapted to machine shelling are being bred.

The snap bean, Green Crop, derived from crosses involving Bountiful, Australian and Streamliner, has long flat stringless green pods containing white seeds and is especially suitable for processing.

238 Annual Report of the Massachusetts Agricultural Experiment Station, 1952-1953 : Bull. No. 475 : Pp. 91.

Apple. The new seedling Puritan (Mass. C-31) has been distributed.

Cranberry. Selection is in progress.

Radish. Progress in the selection of forcing radish is reported. With the aid of a method of sampling roots without loss of the plant as a seed producer, selections with large but non-pithy roots were secured.

Asparagus. Waltham Washington, selected from the variety Washington, has been released. Compared with established commercial varieties it is higher yielding and more resistant to cold and disease.

Cabbage. The aim of breeding is the development of a small-headed type resistant to club-root and yellows. The most promising selections so far obtained are however poor seed-setters.

Lettuce. The Great Lakes and New York types are being improved by selection.

Tomato. The new forcing varieties Hybrids 2-22 and 23, immune from *Cladosporium* leaf mould, are being further selected. Hybrid 2-22 [Improved Bay State x (Improved Bay State x Peruvianum hybrid 44 B292)] is the more desirable type commercially and has been named Waltham Mold-Proof Forcing. It has been crossed to Waltham Forcing in an attempt to obtain an even better forcing type; the F₂ segregated in a ratio of 3 immune : 1 susceptible. In breeding tomatoes with determinate habit for trellis cultivation, a later-maturing strain more resistant to fruit cracking than Trellis 22 has been produced; cracking resistance and late maturity appear to be linked. Another determinate variety, Waltham Beauty, giving higher yields than Red Cloud, has also been developed. F₁ hybrids of field tomatoes with Red Cloud as one parent were again outstanding for their high yields of early, high-quality fruit.

Sweet corn. The hybrid C13-1 x 21547-1-1, distributed to growers for trial, is similar in season to Marcross. Golden Cross Bantam types with very early maturity are being developed. Inbred 21547-1-1 may prove useful as a source of pollen-restoring genes.

**Carnegie Institution of Washington.
Yearbook No. 53 : 1953-54 : Pp. 311.**

*Department of Plant Biology.
Experimental taxonomy (pp. 150-66).*

- 239 Clausen, J., Hiesey, W. M. & Nobs, M. A.
The Poa program. (pp. 151-56).

The relative vigour of the apomictic and sexual progeny of hybrid strains may differ markedly according to environmental conditions; partial apomixis may thus be regarded as a means of ensuring survival in altered environments (cf. Abst. 27). The potentialities of developing a wide range of new apomictic strains by crossing species belonging to different sections are considerable, the behaviour of derivatives of a *P. ampla* x *P. pratensis* cross being described as an example. The older experimental strains are classified provisionally according to agronomic use; they involve various combinations of *P. scabrella*, *P. ampla*, *P. pratensis*, *P. pratensis* var. *alpigena* and *P. compressa*. Work carried out in cooperation with other organizations includes a project with Purdue University to develop apomictic hybrids for the Great Plains region; *P. arida* x *P. ampla* is expected to provide promising material.

- 240 Triplett, E. L. & Clausen, J. *Chromosome numbers of hybrid Poa lines. (pp. 156-57).*

Promising apomictic hybrid lines usually have chromosome numbers which are multiples of 7, although one of the parents of all the hybrids so far investigated was *P. pratensis*, a species with highly variable chromosome number but not characterized by a range of multiple numbers. Each sexual generation in a hybrid line may vary abruptly in chromosome number, compared with the preceding one, such variations usually being accompanied by major changes in other characteristics. The F_1 hybrid line 4273-9 of *P. ampla* x *P. pratensis* var. *alpigena*, for example, has $2n = 63$ and low fertility but one of its F_2 aberrants has $2n = 93$ and is vigorous, fertile and apomictic. Improvement in an apomictic line may also be the consequence of a reduction in chromosome number, e.g. another F_1 line from the cross just mentioned has $2n = 73$ and poor vigour but it has given rise to two vigorous apomictic and fertile aberrants with $2n = 63$ and 70 respectively. A strain of *P. caespitosa* from Canberra, Australia, and another from Marlborough, NZ, have $2n = ca. 56$ and $ca. 90-100$ respectively. The former strain is sexual and can therefore be used in crossing with *P. ampla* and other species with chromosome numbers in the same general

range. *P. iridifolia* from Argentina has $2n = 28$ and is probably related to *P. arachnifera*.

- 241 Grun, P. *Nucleic acid and protein content of isolated root-tip nuclei. (pp. 164-66).*

In further investigations on isolated interphase nuclei of root tips of *Tradescantia* (cf. PBA, Vol. XXIV, Abst. 2760), the total amount of nucleic acid increased with nuclear growth but the amount of total protein did not show a corresponding increase; the increase probably consisted predominantly of ribonucleic acid (RNA). Nuclei from mitotic areas differed from those of differentiated tissue in being smaller and having a lower nucleic acid content; no significant difference was however detected in protein content. Nucleoli of nuclei from meristematic cells had a high content of RNA and were larger than those of nuclei from differentiated tissue.

Department of Genetics. (pp. 205-61).

- 242 Hershey, A. D., Garen, A., Fraser, D. K. & Hudis, J. D. *Growth and inheritance in bacteriophage. (pp. 210-25).*

The transfer of labelled deoxyribonucleic acid (DNA) from parental to offspring phage is not affected by the addition of nonradioactive nucleosides to the culture medium as competitors. The DNA is therefore transferred in relatively large portions, possibly consisting of genetically functional units.

To determine whether the transfer of DNA from virus parent to offspring involves correlated genetic and biochemical effects, investigations were carried out on the properties of self-inactivated superinfecting phage and of phage inactivated by β or ultraviolet radiation, using genetically and isotopically marked phages. Most of the phage particles inactivated by β rays do not inject their DNA into the cells to which they become attached. With ultraviolet treatment, ability to inject DNA is only moderately diminished; this situation therefore offers a promising approach for elucidating the relationship between genetic and metabolic activity. Only half of the labelled DNA of superinfecting phage entered the cells, where it was accessible to at least one bacterial enzyme. This DNA however persisted after entry without genetic or metabolic function when bacterial nuclease was inhibited by low Mg concentration. In mixed infection with the related phages T2 and T4, the DNA of T4 alone being labelled by P^{32} , the P^{32} originally present in the parental T4 phage appeared not only in the T4 progeny but also to a large extent in T2 progeny. The

process responsible for the distribution of parental DNA is not yet known.

A large class of host-range variants of T3 arise only in bacteria in which lysis is delayed. These variants differ from the wild type in several loci but appear to be the result of a single event. The hypothesis that they are the result of exchanges of genetic material between the phage and host cell is being tested.

Investigations on the conversion of bacterial to virus nucleic acid and on the synthesis of virus protein are also reported.

243 Demerec, M. et al. *Bacterial genetics. I.* (pp. 225-41).

Transduction tests on strains of *Salmonella typhimurium* deficient in synthesis of adenine, cystine, histidine, proline, serine or tryptophane indicated that similar auxotrophs can be divided into well-defined groups. Between auxotrophs of the same group, transduction either does not occur or is significantly less frequent than between auxotrophs and wild-type bacteria or between auxotrophs belonging to different groups. The grouping based on transduction tests coincides with that defined by investigating blocks in the synthesis of the required compound. The members of each group are therefore probably allelic. The gene locus apparently occupies an extended section of a chromosome, changes in different sites in this section giving rise to distinct alleles.

Results from linkage experiments suggest that a replica of the transducing segment, formed during chromosomal duplication, is incorporated into the bacterial chromosome by a process similar to crossing-over in higher organisms. Since only one linkage group of three loci has so far been detected, the segment introduced by the phage is probably fairly short.

Suppressor mutations in *Salmonella* have been detected and analysed genetically by means of transduction.

The mutagenic influence of X rays, ultraviolet rays, nitrogen mustard, diepoxybutane and triazine on *Escherichia coli* was investigated. Several cases of specific mutagen stability were detected. Genetic background affected the mutability of certain genes.

The results of experiments on the modification of the effects of ultraviolet irradiation by light and by extending the period of incubation in the dark before plating, upon a number of genes in *E. coli*, suggested that ultraviolet light primarily affects cell metabolism, the induced changes then affecting the genetic constitution; peroxides are involved in the ultraviolet-induced

reaction resulting in the continuing after-effects observed.

Twenty-seven compounds of interest in connexion with cancer chemotherapy were investigated for their mutagenic effect upon *E. coli*. Spontaneous mutation was studied in populations of *E. coli* grown at a reduced rate under chemostat conditions. Accumulation of T5-resistant mutants and of mutants showing reversion from mutational deficiency was curvilinearly related with time. A method of mathematical analysis was developed for determining the rates of spontaneous mutation at different rates of growth when selection was either for or against the mutant.

244 Witkin, E. M. & Lacy, A. M. *Bacterial genetics. II.* (pp. 241-46).

Transduction in *S. typhimurium* is characterized by a pattern of delayed appearance expressed as a function of the multiplication of the population. The degree of dominance exhibited by a particular locus may affect this pattern. Transduced cells do not occur in pure clones but in mixed clones containing nontransduced cells of the parental type. In a comparison between the patterns of delayed appearance of transduced and ultraviolet-induced prototrophs arising from four auxotrophs, the amount of delay proved to be consistently greater in the case of ultraviolet-induced mutation. Delay in the appearance of induced mutants is ascribed to delay in actual mutation or selectively delayed onset of multiplication in the mutants, or to both these factors.

245 Kaufmann, B. P. et al. *Organization of cellular materials.* (pp. 246-54).

Mitotic disturbances similar to the primary effects induced by ionizing radiations have been observed in roots of onion and lily treated with ribonuclease (cf. *PBA*, Vol. XXV, Absts. 1571 and 1574). Structural rearrangements were not induced in *Drosophila* chromosomes by treating males with an aerosol of ribonuclease. It is therefore suggested that the production of secondary effects involves a more fundamental degradation of the nucleoprotein complex than the induction of primary effects.

Treatment of onion roots with cytochrome C induced stickiness and excessive contraction of the chromosomes, c-mitoses and polyploid cells. The effects of ionizing radiations on nucleoprotein gels were investigated. With the aid of a television microscope, quantitative changes in the nucleic acids in different parts of the living cell during ultraviolet irradiation were recorded. Development of a method for

obtaining serial sections, in any quantity desired, for electron microscopy has greatly improved the prospects of interpreting cellular organization in a three-dimensional manner. This method is also expected to throw considerable light on nuclear-cytoplasmic relationships and on the nature of individual loci.

246 McClintock, B. *Mutations in maize and chromosomal aberrations in Neurospora.* (pp. 254-61).

Further information was obtained on the spread of mutation on either side of the transposable gene-controlling unit *Ds* (cf. *PBA*, Vol. XXIV, Abst. 2760), attention being given mainly to seven independently initiated cases in which the spread covered a relatively long segment which was situated to the left of *Ds* in chromosome 9 and included the locus *I*. The data suggested that within the same chromosomal region similar modifications had occurred in all seven cases, disparities in genetic behaviour being due to differences in the extent of the alteration beyond this region.

The system controlling genic expression at a_1^{m-1} is considered to be composed of two units, one at locus A_1 in chromosome 3 and another unit, *Spm*. *Spm* behaves not only as a mutator but also as a suppressor. An *Spm* unit has been found to be linked with *Y* and located in chromosome 6.

Strain 4637 of *N. crassa* carries a reciprocal translocation between chromosomes 1 and 6. The position of the break in each of these chromosomes was readily determined. In contrast, analysis of the structural modification present in strain 45502 was inconclusive. Substrains of 45502 each possessed a haploid complement of seven chromosomes plus a fragment. At prophase I in the asci produced by crossing the substrains with wild types, synapsis was highly irregular, terminal associations between nonhomologous chromosomes being frequent. In one cross a structurally abnormal chromosome 5 was introduced by the wild-type parent. It is therefore suggested that the chromosome constitution of wild-type and tester stocks should be determined prior to their use in crosses requiring cytogenetical analysis.

247 Research in agriculture. Annual Report of the Louisiana Agricultural Experiment Station, 1953-54 (1955) : Pp. 288.

Rice. Further intervarietal crosses were made at the Rice Experiment Station, Crowley. Toro (4-II-14-8 x Bluebonnet) was released (cf. *PBA*,

Vol. XXV, Abst. 2014); compared with Bluebonnet it is higher yielding, superior in milling quality, shorter and stronger strawed, more uniform in plant type and ripening, and possibly less susceptible to smut. The early-maturing, medium-grained selection 44C507 (Rexoro-Purpleleaf x Magnolia), superior to Zenith and Magnolia in several respects, may be released in 1956. Other outstanding selections comprise: 42C403 (250-3 x Magnolia), medium-grained, earlier maturing than Magnolia and at least equal to it in yield and milling properties; 45-C554 (Rexoro-Purpleleaf x G), long-grained and later maturing than Bluebonnet and earlier than Texas Patna, and therefore suitable for filling the place once taken by the discarded Blue Rose in the harvest schedule; and 45C15/16 Rex-3-22 (Rexoro⁴ x Blue Rose), resistant to *Cercospora* leaf spot but otherwise similar to Rexoro (cf. *PBA*, Vol. XXV, Abst. 2013). Sunbonnet, a reselection of Bluebonnet, was released (cf. *PBA*, Vol. XXIII, Abst. 2711). The possibility of inducing mutations by treating Magnolia and Rexoro with X rays and neutrons is being explored.

Dallis grass. Breeding has as its aim the development of improved forage types which also possess an inherent ability to produce good-quality seed. The results of tests of clones representing different ecotypes and their progenies suggest that environmental influences may affect plant-to-plant variation within progenies to a greater extent than genetic disparities.

Red clover. Special attention is being given to resistance to *Erysiphe polygoni*.

White clover. Foundation seed of Louisiana S1 is being produced (cf. *PBA*, Vol. XXII, Abst. 1223). Polycross tests revealed the suitability of several clones for the development of synthetics.

Lespedeza. Late-maturing strains developed from natural stands in the vicinity of Baton Rouge have given high yields of dry matter per acre.

Potato. Crossings were effected among advanced seedlings and established varieties. The scab-resistant red selection 92-23 shows promise as a variety for autumn growing. Seedling 91-258 (Green Mountain x Katahdin), an oblong russet type resembling Russet Burbank, may shortly be ready for naming and distribution. Red LaSoda, a mutant of LaSoda, again gave an outstandingly good performance not only in Louisiana but also in other states. Investigations on long-period storage of pollen

are in progress. Preliminary tests on the transportation of viable pollen by air were successful.

Sweet potato. Breeding for resistance to *Fusarium* wilt, internal cork and soil rot and for other improvements continued.

Cotton. Selections highly resistant to bacterial blight have been obtained from (1) the back cross of Stoneville 20 x Deltapine 14-312 to Deltapine and (2) a hybrid from Texas with a considerable proportion of germplasm from Stoneville 2B. New strains of Coker 100 Wilt, Auburn 54, Coquette, Stoneville 2B-R, Acala, Roxie and W-46-1-4 displayed resistance to the disease complex of *Fusarium* wilt and the nematode *Rotylenchulus reniformis*; Louisiana 33 x Deltapine 14-312, Auburn 56 x Deltapine 14-312, Delfos 425-920 x Deltapine 6 and Delfos 9169 x Cook 307-6 were also resistant.

Sugar cane. At Baton Rouge, seedlings were selected from crosses made at Canal Point, Fla. In 1953 flowering was induced at Baton Rouge for the first time. Of the unreleased varieties tested under commercial conditions, CP48-103 and CP47-193 were the most promising, comparing favourably with CP44-101.

Strawberry. Selections O-188 and O-242, higher yielding than standard varieties, are undergoing trials by growers. L-27 is to be released as a new variety. All three selections have proved superior to standard varieties in freezing tests.

Onion. Promising seedlings are undergoing field tests for commercial type and resistance to yellow dwarf, pink root and other diseases. Breeding material was selected for resistance to downy mildew under Californian conditions since for several years the disease has not appeared in a sufficiently severe form in Louisiana.

Shallot. Shallots have been crossed with the Nebuka onion as a source of resistance to pink root and yellow dwarf. Bayou Pearl and Wintergreen, both selected from open-pollinated seed of Louisiana Pearl, were released (cf. *PBA*, Vol. XXV, Abst. 2443).

Lines A58 and A57 show promise as possible substitutes for Homer Red.

Water melon. Two promising strains from Calhoun Sweet x Black Diamond resemble Black Diamond in their dark green rind but are much better in quality. The selections are resistant to wilt and one is also highly resistant to sunburn.

Tomato. Progress is reported in breeding for resistance to *Fusarium* wilt, grey leaf spot and fruit cracking.

Okra. Lines showing promise of meeting the specific requirements of processors and of the fresh-market trade have been developed. Several bear fruits similar to those of Louisiana Green Velvet, but have dwarf habit and narrow leaves and would therefore be easier to grow and harvest.

Cowpea. The variety Louisiana Purchase was released in 1953 (cf. *PBA*, Vol. XXV, Abst. 828).

248 Results of research in 1953. 66th Annual Report of the Director of the Kentucky Agricultural Experiment Station : Pp. 93.

In addition to the work described below, varietal trials of cereals, various fruits, tomato, cucumber and other vegetables have been carried out.

Grasses. A very high degree of correlation was found between drought resistance and rust resistance in 150 clones of *Poa pratensis*. The strains differed significantly from each other in maturity, vigour, leafiness and width of leaf. Colchicine treatment of F_1 hybrids between ryegrass and tall fescue has resulted in the production of seed from which two plants have been obtained.

In tests of 11 varieties of *Bromus inermis*, southern types generally gave higher yields than northern.

Red clover. Of 126 clones inoculated with a single strain of yellow mosaic virus of bean, eight failed to develop symptoms, 95 showed some degree of mottling or vein yellowing, 10 became seminecrotic and 13 showed systemic necrosis.

Hemp. An attempt is being made to develop a monocious variety with uniform maturity to replace dioecious varieties in which male and female plants mature at different times with the result that the fibre lacks uniformity.

Tobacco. Strain 224, one of a number of burley lines with a high degree of black-shank resistance derived from *Nicotiana longiflora*, gave 40-60% resistant F_1 hybrids when used as the female parent in crosses with susceptible tobacco; when used as the male parent, very few resistant hybrids were obtained. Strain 224 and its derivatives have a low degree of fertility. Strain 144 and its derivatives, which are also resistant to mosaic and black root rot, appear to have two kinds of black-shank resistance, some plants being resistant in both leaf and root and others only in the root. Black-shank resistant hybrids are being studied which are also resistant to wildfire, *Fusarium* wilt, mosaic and black root rot. Black-root-rot resistant

burley varieties with wildfire resistance derived from *N. longiflora* and mosaic resistance from *N. glutinosa* are undergoing trial. A number of tobaccos of the burley type with low nicotine contents of approximately 0.0, 0.5, 1.0 and 2.0% have been developed. Resistance to black shank is being transferred from *N. longiflora* to dark-fired and air-cured tobaccos which are already resistant to wildfire, mosaic and black root rot. Strains with resistance to *Fusarium* wilt have been developed in the dark tobacco One Sucker. Single zoospore cultures of *Phytophthora parasitica* var. *nicotianae* from 35 tobacco fields were found to comprise 33 oogonial and two antheridial strains. The occurrence of heterothallism suggests that the organism may be subject to considerable variation resulting from hybridization.

Strawberry. The varieties Temple, Vermilion, Tennessee Beauty, Sparkle, Fairland, Red Crop, Missionary, Armore, Tennessee Stripper and Premier were crossed in various combinations, the highest percentage of good selections being obtained from Vermilion x Sparkle.

249 **Biennial Report of the Hawaii Agricultural Experiment Station 1952-1954 (1955) : Pp. 72.**

In addition to the work reported below, trials of fruit and vegetable varieties have been conducted.

Sweet potato. Genetic studies on this crop have been summarized in Abst. 512.

Fruits. Solo 8, an improved strain of the papaya Solo, was released. The fruit is of good quality and more uniform in size and weight than that of other strains. Neither inbreeding nor crossing of two Solo strains was followed by a decrease in vigour. Natural inbreeding occurs readily through self pollination of hermaphrodite flowers in the bud stage.

Four selections of guava and several of yellow passion fruit show promise. Groff, a new variety of litchi, has been released.

Lettuce. A new summer-heading variety, Anuenue, has been released. It is of high quality, has crisp leaves and is more resistant to tipburn and slower to bolt than Manoa, one of its progenitors. Anuenue and another new variety, Kaala (cf. *PBA*, Vol. XXV, Abst. 876), are both undergoing further hybridization to improve their resistance to *Rhizoctonia* and leafhopper damage.

Cucurbits. Musk-melon accessions from Spain and Greece are being crossed with the mildew-resistant variety Georgia 47 in an attempt to combine better fruit quality with resistance to

two forms of powdery mildew and one form of downy mildew.

Resistance to cucumber mosaic, *Fusarium* wilt and anthracnose is being incorporated into water melons with the desirable characteristics of Congo and Fairfax. Efforts are being made to combine the mosaic resistance of the cucumber Ilima with resistance to powdery mildew.

Tomato. Plants which combine the desirable qualities of their parents have been obtained from crosses between large-fruited strains with high ascorbic acid content and lines resistant to bacterial wilt, tobacco mosaic virus and root knot nematode. Of 45 plants of line 4960, 44 proved resistant to bacterial wilt; two of these 44 have produced lines highly resistant to nematode attack. The Hawaiian lines Lanai and Niihau, which are superior in yield to the best mainland lines, have been considerably outyielded by their F_1 hybrids.

Inaugurazione del Centro Appenninico e Assemblea della Società di Genetica Agraria. (Inauguration of the Apennine Centre and General Meeting of the Society for Agricultural Genetics).

Genet. agr. 1955 : 5 : 47-271.

A full verbal account is given of the opening ceremony of the Apennine Genetical Centre at Terminillo on 22 Aug. 1954 and of the first general meeting of the Italian Society for Agricultural Genetics which followed. The papers presented at the meeting included the following:—

250 Rotini, O. T. *I problemi agrari della montagna. (The agricultural problems of the mountains).* (pp. 123-42).

In a general consideration of the problems, due importance is given to the contribution of plant breeders in producing strains of improved tolerance of the unfavourable conditions of mountain zones.

251 Bottazzi, G. B. *Il miglioramento genetico delle foraggere per l'ambiente appenninico. (The genetic improvement of forage plants for the conditions of the Apennines).* (pp. 143-57).

The viewpoint is sustained that the flora of the central Apennines is sufficiently rich in good herbage species to make it possible to effect marked improvements by management alone; further improvements will be possible by selection of superior lines and it is thought improbable that there will be any need to import strains

from America or elsewhere. By hybridization, the author has succeeded in combining the drought resistance of the local populations of *Dactylis glomerata* with the leafiness of the strains from Lodi. In *Lolium italicum*, compact, leafy types which persist for at least five years have been selected from the populations of the Agro Romano, the average persistency of which is only two years; these selections are being reproduced in groups to produce a synthetic variety. Selection in a very drought-resistant strain of *Trifolium repens* has improved the germinating capacity of its seeds, which previously were so hard and slow in germinating that the strain could not be reproduced.

A list is appended of the best forage species of grasses and legumes occurring in the flora of the central Apennines.

- 252 Maitan, D. & Zanotti, L. *Contributo alla valorizzazione della montagna. (Contribution towards full utilization of mountain land)*. (pp. 173-211).

Trials of a large number of crop species and varieties have been instituted at an experimental station near Trent in northern Italy, at an altitude of 1600 m., close to the limit of cultivation. A report is given on the behaviour of different varieties of lucerne, various clovers, sainfoin, various grasses, root crops, cereals and vegetables. Some of the selections of cauliflower, lucerne, clover, *Dactylis glomerata* and other plants made at the station have done well when grown in the Apennines, and some of them even in the plains, of peninsular Italy.

- 253 Bianchi, A. & Bottazzi, A. *Meccanismi genetici nel tempo di fioritura in un incrocio di Zea mays. (Genetic mechanisms in flowering time in a cross of Z. mays)*. (pp. 213-27).

Further data (cf. *PBA*, Vol. XXIV, Abst. 2894) on the dates of anthesis of varieties A96 and K65 and of their reciprocal F_1 and F_2 hybrids and the back cross suggest that the parent varieties differed in 4-6 pairs of genes, those for earliness being partially dominant. There were indications that they were not all equal in effect and some of them may be linked with grain colour.

- 254 Dionigi, A. *Sul miglioramento genetico dei frumenti per la montagna. (Genetic improvement of wheats for the mountains)*. (pp. 229-35).

Reference is made to the production by Strampelli of his first wheat-rye hybrid, named Terminillo, of the wheats Augusta, Nuria and others, suitable for high ground, by selection from a local population, and of a whole series

of hybrid varieties; these were followed by Oliva's Est Mottin [Mottin East] and a succession of hybrids from it. An analysis of the growth rhythm of Est has shown that the reason it does so well in mountain climates is that its growth is very slow in the first phase up to ear development and exceptionally fast from then to ripening. By selecting for this rhythm combined with greater number of grains per spikelet and better standing capacity the author has succeeded in producing Ovest [West], which has beaten all other mountain wheats in yield, standing power, hardiness and tolerance of summer heat. Others are now under observation.

- 255 Grifoni, E. *Un nuovo grano duro per l'Italia meridionale. (A new hard wheat for southern Italy)*. (pp. 245-48).

The wheat Grifoni 235 originated from a plant collected in the Apennines of southern Italy at an altitude of 800 m., and thought to be a natural hybrid of Cappelli with another form of *Triticum durum*, probably Aziziah; the new wheat is 4-6 days earlier than Cappelli, has somewhat stronger straw and has produced 8 q. more grain per ha. over a wide area where it is now cultivated.

- 256 Marchesi, G. *Osservazioni su caratteri ereditari in razze di pomodoro. (Observations on hereditary characters in tomato varieties)*. (pp. 253-60).

Studies of a number of morphological characters of fruits and inflorescences in crosses between seven varieties of *Lycopersicon esculentum* and one of *L. pimpinellifolium* showed most of them to be inherited on a monohybrid basis; deviations were noted in the F_2 of some of the crosses with the variety Palla d'oro [Golden Ball] and with *L. pimpinellifolium*. The hybrids of *L. pimpinellifolium* tended to inherit the mosaic resistance of that species in the F_1 but the degree of resistance varied in different crosses, differing sometimes in reciprocal hybrids. Many of the hybrids between the cultivated varieties were more resistant than the parents. Resistance segregated in the F_2 . The resistance of *L. pimpinellifolium* to *Alternaria solani* on the other hand proved recessive.

- 257 The Plant Breeding Institute, Cambridge.

Nature, Lond. 1955 : 176 : 487-88.

The new premises at Anstey Hall Farm, Trumpington, near Cambridge, were officially opened on 15 July 1955. Summaries of the addresses given upon the occasion are followed

by an account of the expanded facilities in the new buildings and experimental grounds.

258 JONES, E. T.

Welsh Plant Breeding: new headquarters and experimental grounds.

Nature, Lond. 1955 : 176 : 670-71.

The new headquarters at Plas Gogerddan were officially opened on 8 August 1955. The facilities available for the programme of grass, clover and cereal breeding are described.

259 SEDLMEYR, K.

Emil Grábner 1878-1955.

Z. Pflanzenz. 1955 : 34 : 331-32.

A brief account is given of the life and career of E. Grábner, one of the pioneers of plant breeding in Hungary.

260 JACQUARD, P.

In memoriam: Vsevolod Novikof.

Ann. Serv. bot. Tunis 1952 : 25 : 171-96.

A brief account is given of the life and work of the Russian emigrant V. Novikof, who became one of the foremost authorities on Tunisian agriculture and is best known for his breeding work on tobacco, leguminous crops and vegetables.

261 KOPETZ, L. M.

Die Bedeutung der Auslese von Rezes-siven für die Kombinationszüchtung von Selbstbestäubern. (**The importance of the selection of recessives for combination breeding in self pollinators**).

Z. Pflanzenz. 1955 : 34 : 319-24.

After stressing the importance of restricting, from the F_2 onwards, the number of progeny of a given cross to the minimum consistent with the retention of potentially valuable genotypes, the author presents a series of formulae, appropriate to the number of recessive, dominant or intermediate characters for which it is desired to select, designed to facilitate the roguing of the less desirable plants in the population.

262 BÖHME, H.

Die entfernte Hybridisation als Methode der Pflanzenzüchtung. (**Distant hybridization as a method of plant breeding**).

Wiss. Z. Martin-Luther Univ. Halle-Wittenberg 1954/55 : 4 : 747-53.

The author claims that more research requires to be carried out on the question of inter-generic hybridization with a view to increasing the resistance of cultivated plants, especially cereals, to low temperatures, pests and diseases. In this connexion, successes achieved by Cicin in crossing *Triticum* spp. with *Agropyron* sp. (cf. Absts. 274-94), *T. aestivum* with *Elymus*

arenarius, *Hordeum nutans* with *E. giganteus* and *Secale cereale* with *E. arenarius* (cf. PBA, Vol. XXV, Abst. 3121) are discussed in detail.

263 SINGLETON, W. R.

Atomic energy . . . new tool for plant breeders.

What's New Crops Soils 1955 : 7 : No. 8 : 22-23.

A popular account is given of some of the valuable mutants obtained in Sweden and the USA through exposure of cereals, groundnuts and carnations to X-rays or to radioactive materials.

264 BERGANN, F.

Einige Konsequenzen der Chimärenforschung für die Pflanzenzüchtung.

(**Some consequences of chimera research for plant breeding**).

Z. Pflanzenz. 1955 : 34 : 113-24.

A critical review of the literature on the occurrence of somatic mutations and chimeras in plants of economic or horticultural interest is presented, mention being made of varieties of apple, potato and other crops that have arisen from chimeras.

265 ENČEV, JA.

(**Effect of autumn and winter conditions upon developments of new species and forms in non-overwintering spring crops**).

Agrobiologija (Agrobiology) 1955 : No. 3 : 90-95. [Russian].

Instances of conversions of *Avena sativa* into *A. fatua* and of *Vicia sativa* into *V. villosa* were observed in Bulgaria, where some spring varieties of oat, vetch and wheat were grown for two years as winter crops. In wheats changes occurred in respect of ear characters (Odessa 13 and Lutescens 1163) and the shape and consistency of the grain (Sarrubra). Odessa 13 produced awnless plants of other botanical varieties and two unfamiliar forms that combined characteristics of *Triticum spelta*, *T. durum* and *T. vulgare*. A plant of Lutescens 1163 bore ears of two botanical varieties: *lutescens* and *erythrospermum*.

266 KAPPERT, H.

Der Patentschutz für Pflanzenzüchtungen. (**Patent safeguards for plant breeders' productions**).

Z. Pflanzenz. 1955 : 34 : 307-18.

The possibility of applying German patent laws as they now stand to the protection of breeders' rights is discussed. The author inclines to the view that although existing laws could be interpreted in such a way as to afford the breeder

some measure of protection as far as specific breeding methods and the production of hybrids or selections by means of these methods is concerned, they do not cover the exploitation of chance sports or mutants.

267 ŠEVČUK, T. N.

(**Material of the 1950 expedition**).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 125-28. [Russian].

An outline is given of the results of a collecting expedition carried out in different parts of the Soviet Union in 1950. Drought-resistant forms of various forage plants, apples that ripen in June, others that keep till the following June, pears resistant to scab, apples resistant to woolly aphis and plums and pears of excellent dessert quality are among the most interesting material collected.

CEREALS

268 PARKIN, A.

Farming's share in the peaceful atom.
1. Plant Breeding.

Frms'. Wkly. 1955 : 43 : No. 8 : 80-81, 83.

A popular review of the work being done at the Guinness Barley Research Station and Plant Breeding Institute, Cambridge, on the induction of economically useful cereal mutants by X-rays and neutrons is given.

269 SCHILDT, A. R.

Förädling av höstsäd på Hankkija.
(**Breeding of winter cereals at Hankkija**).

Tidskr. Lantm., Helsinki 1955 : 37 : 122-23.

Notes are given on varieties developed recently at stations in Finland. Visa is a winter rye resembling Pekka but having a larger grain and giving higher yields; tetraploid ryesshow promise in respect of straw strength and grain size but have low fertility. The Hankkija winter wheat a3757 has given a 20% greater yield on clay soils than Varma and has a larger grain, better baking quality and greater winter hardiness; its straw is longer, however, and less strong, and it does less well on light soils.

270 SALZMANN, R.

Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1954. (**Report on the work of the Federal Agricultural Research Station during the year 1954**).

Landw. Jb. Schweiz 1955 : 4 : 383-445.

The results of variety trials of wheat, oats,

barley, rye and maize are included. In cereal breeding, emphasis is being placed on improving resistance to lodging, brown rust and leaf scorch. A number of unspecified American wheat varieties have proved resistant to dwarf bunt and are being crossed with susceptible varieties to determine the mode of inheritance of resistance.

271 POPOV, P.

(**50 years research at the Sadovo Agricultural Scientific Research Station. 1902-1952**).

Spis. nauč.-izsled. Inst. Minist. Zemed., Sofia 1953 : 20 : No. 1 : 3-16. [Bulgarian].

Mention is made of new varieties of wheat and rye which outyield existing varieties and standards. For instance, the wheats Jubileina 1 [Jubilee 1], Jubileina 11 and Jubileina 111 produce 20-30% more grain than Sadovo.

272 FAJERSSON, F.

Det svenska Hertakornet går bra i USA och Kanada. (**The Swedish barley Herta does well in the USA and Canada**).

Lantmannen, Stockholm 1955 : 39 : 679-81.

In a popular account of his impressions of a six months' tour of cereal breeding stations in North America, the author points out that in the USA and Canada the chief breeding objective is disease resistance rather than yield and quality as in Sweden. It is noted that the Swedish barley Herta has done well in trials in Canada and the northern states of the USA.

273 OSWALT, R. M.

Wheat, oats, and barley in state-wide variety tests 1950-54.

Bull. Okla. agric. Exp. Sta. 1955 : No. B-456 : Pp. 35.

The results of trials carried out on varieties of winter wheat, spring oats and winter barley in Oklahoma are reported.

CICIN, N. V.

(**Distant hybridization in plants**).

Gosudarstvennoe Izdatel'stvo Sel'sko-hozjaistvennoï Literatury, Moskva 1954 : Pp. 430.

A number of the author's works published in the years 1935 to 1953, mostly dealing with wide crosses in the cereals, are collected together and reprinted under one cover in this volume. Several of the original works have been summarized in *Plant Breeding Abstracts*, while some of them were published in out-of-the-way journals or in the difficult war and postwar

periods and have not been referred to. The contents are as follows:—

274 (*The problem of winter and perennial wheats*). (pp. 3–63).

This recapitulation of the author's early work with *Agropyron* spp. (cf. *PBA*, Vol. V, Abst. 78) is based on a text published in 1935.

275 (*What does crossing wheat with Agropyron give?*). (pp. 64–96).

This is a somewhat abridged version of the text published in 1937 (cf. *PBA*, Vol. VIII, Abst. 1156).

276 (*Darwinism and wide hybridization*). (pp. 97–115).

No strict Mendelian segregation has been observed in the *Triticum* x *Agropyron* hybrids; the chromosome number in hybrids of *T. vulgare* x *A. elongatum* may be $2n = 28_{II}, 21_{II} + 14_I, 14_{II} + 28_I, 7_{II} + 42_I$ or 56_I ; differences in the reduction division were observed even within the same plant, and the meiotic behaviour of any individual was not correlated with its degree of fertility: some plants with no bivalents at all proved partially fertile, and all gave better sets when open pollinated than when pollinated artificially; a certain amount of grain was set in pollinations of the hybrids with wheat pollen and *vice versa*. From this it is concluded that the sterility of the hybrids is dependent on functional disturbances in both ovule and pollen. These facts are cited in support of what is described as the Darwinian view of species as opposed to the Mendelian view of them as sharply differentiated entities separated by a sterility barrier. Further evidence is adduced from a number of intergeneric grafts which are described. It was found that etiolated plants of combinations that normally take quite well failed to unite.

277 (*Extending winter crops towards the eastern regions of the USSR and producing new varieties of winter crops*). (pp. 116–39).

See *PBA*, Vol. XI, Abst. 943.

278 (*Hybridization—a powerful method in Mičurin's plant breeding*). (pp. 140–59).

See *PBA*, Vol. XII, Abst. 975.

279 (*Prospects of breeding winter-hardy forms of winter crops*). (pp. 160–69).

See *PBA*, Vol. XV, Abst. 1393.

280 (*Results of our work on creating perennial wheats during the war years*). (pp. 170–77).

Reference is made to the spring wheat 22850, a *Triticum* x *Agropyron* hybrid possessed of strong straw and resistance to loose smut and other

diseases and of extremely high baking quality; in the Moscow province it has yielded over 50 c. per ha. Hybrid 599, a winter wheat, has given up to 60 c. per ha. and is free from lodging and shedding and very resistant to *Tilletia tritici*. The first perennial wheat, 34085, tolerates saline soils, is resistant to diseases, drought and lodging and has a higher gluten content than existing varieties; in the south it has given grain for 2–3 successive years without resowing, in quantities equal to the yields of the standard varieties. Nos. 2 and 3 are superior to 34085 in grain quality and are winter hardy.

Several fertile hybrids from the triple cross *Secale* x *Triticum* x *Agropyron* are now under observation, and other combinations that have been obtained are *T. aestivum* x *Elymus arenarius* with $2n = 49$, *Triticum* x *Secale* x *E. arenarius* with $2n = 56$, *Hordeum sativum* 'Viner' x *E. giganteus* with $2n = 28$, *Triticum* x *Agropyron* x *E. giganteus* with $2n = 52$, *T. durum* x *E. arenarius*, *Secale montanum* x *E. giganteus*, *A. elongatum* x *E. giganteus* and *A. elongatum* x *E. arenarius*.

281 (*Investigations in the sphere of vegetative-sexual hybridization of herbaceous with woody plants*). (pp. 178–99).

Caragana arborescens has been used in Siberia for food and is of interest on account of the high protein content of its seeds and its extreme tolerance of cold, drought and saline conditions. Attempts to pollinate it with the garden pea, *Pisum sativum*, were unsuccessful and pollination of the pea with *C. arborescens* gave rise to seedless pods; in the latter cross, pollen germination on the style was seen to be very slight. Pollen of *Robinia pseudacacia* on the other hand germinated well and almost reached the ovules, in spite of the difference in chromosome number ($2n = 14$ in the pea, $2n = 16$ in *C. arborescens* and $2n = 20$ in *R. pseudacacia*). After many attempts, successful grafts were made of young pea seedlings on to 1–3 year trees of *C. arborescens*. Seed from these grafts gave rise to plants which could be grafted more easily on to *C. arborescens*. No alteration in the morphological characters of the scion was detectable even after five or more successive grafts, but a number of changes were observed in the seed progenies of the grafted plants; they were not however transmitted to the succeeding generations. Other grafts referred to in which no hereditary changes have been observed are tomato, egg plant and *Solanum nigrum* on *Cyphomandra betacea* ($2n = 24$); crosses between the stock and scion gave either parthenocarpic fruit, or, in the case of tomato, fruit with minute seeds, but the hope is

expressed that successful crosses will ultimately be achieved by the use of this technique.

282 (*A hybrid of dewberry with Rubus saxatilis*). (pp. 200–04).

A seedling from *R. flagellaris* var. *roribaccus* 'Lucrezia' having $2n = 42$ was pollinated with *R. saxatilis* ($2n = 28$) in 1944 and one well-formed fruit with 12 seeds was obtained. Three hybrid plants were produced, all having 35 somatic chromosomes. Both the plants that finally survived proved to be annuals in habit and were preserved as cuttings.

283 (*Summary of work on distant hybridization in plants*). (pp. 205–19).

Later studies have shown that the *Agropyron glaucum* var. *genuinum* used in the production of the first perennial wheats is heterogeneous in respect of type of rhizome, spring and winter habit and degree of perennation. A knowledge of this variation makes it possible to make a more careful choice of parents in breeding for particular objectives. Among the annual spring wheats produced from *Triticum* x *Agropyron* crosses, hybrid 52992 is mentioned specially on account of its drought resistance and good quality; it has yielded 7.5 c. per ha. more than the standard varieties of the Alma-Ata area in dry years and in the three years 1944–46 exceeded the standard 0841 by 36%. Others have exceeded *Lutescens* 62 by up to 53%. For strength of straw, 22850 and Flora 5 are mentioned, the latter form having given yields of up to 52.6 c. per ha. on small plots; even in moist years it gives vitreous grain of high quality. Some of the annual winter hybrids are resistant to bunt and one of them, Šehuridinovka (Hybrid 599) is resistant also to loose smut and in the Moscow region has given yields exceeding the local standards, 2411 and others, by up to 41.7%, the yield from a 5 ha. plot amounting to 37.4 c. per ha. Some of these hybrids when crossed with common bread wheats have given rise to a new series of promising hybrids, the best of which have yielded up to 43 c. per ha. and displayed good baking quality and resistance to smut. These wheats are more winter hardy than Kooperatorka but nevertheless behave as alternative wheats.

In producing the perennial hybrids, selection is practised only in the second year, after the plants have given two yields of grain. Hybrid 2 ($2n = 56$) is constant morphologically but still segregates for self fertility, but by selection a line with up to 90% self fertility has been obtained. The grain has a higher gluten content

and fermentation time, though the gluten is less elastic than that of the standard wheat 2411. Its yields show a sharp decline in the third year of growth and beyond.

Over 30 crosses of *Elymus* spp. with wheat, barley and rye have been produced, the most interesting being those with *E. arenarius* and *E. giganteus*; the sterility of the hybrids is being overcome by the use of colchicine and by making bridging hybrids such as *E. arenarius* ($2n = 112$) x *E. giganteus* ($2n = 56$), *Hordeum nodosum* x cultivated barley, *H. nodosum* x *E. arenarius* x cultivated barley, *H. nodosum* x *E. arenarius*, *Critesion jubatum* x *E. giganteus* and *H. nodosum* x *C. jubatum*. Complex hybrids obtained include (*Triticum* x *Secale*) F_1 x *E. arenarius* and (*Triticum* x *Agropyron*) F_1 x *E. giganteus*. It is found that *T. vulgare* and *T. durum* will cross with *E. arenarius* but not with *E. giganteus*; if the *Triticum* sp. is crossed with *Agropyron* a 0.5% set is obtained when the hybrid is pollinated with *E. giganteus*. Seedlings of many of the hybrids have been obtained only by embryo culture.

284 [*Ways of creating new cultivated plants (distant hybridization)*]. (pp. 220–40).

The Mičurinist basis of wide crossing is expounded, together with the advantages of *Agropyron* as a source of characters for improving cultivated wheat. Reference is made to hybrid 22850, which is free from lodging and shedding, extremely high in milling and baking quality, resistant to fungous diseases and quite good in yield, having given 54 c. per ha. in 1945 in the Moscow province; even in wet years it stands well and retains its grain quality. Favourable mention is accorded also to Flora 5 and Šehuridinovka; the latter stands well and has yielded up to 36–37 c. per ha. in the Moscow province and 45 c. per ha. in the Alma-Ata region. Further reference is made to perennial hybrid 34085, which in Kazakhstan and Kirgizia has given a yield of grain in 2–3 successive years and often outyielded the local standards. No. 2 produced 220–900 grains per plant in the first year, 150–800 the second and 100–750 the third.

In 1947 the first fertile rye x *Agropyron* hybrids were obtained by the method of polyploidy and now a number of different combinations of *Secale* x *Triticum* x *Agropyron* are under investigation. Reference is also made to hybrids of *Elymus arenarius* and *E. giganteus* with various forms of wheat, rye and barley (cf. Abst. 283) and to various new graft combinations (cf. Abst. 281).

285 (*Experiments with perennial wheats*).
(pp. 241-88).

Various possible rotations using perennial wheat for grain the first year and undersowing it with lucerne, clovers or other legumes in the second and third years are discussed. The quality of the perennial wheats is not yet as good as that of the annual hybrids and they are variable as regards fertility. In back crosses with common wheats these defects are overcome but the perennial habit is mostly lost and better results have been attained by crossing the hybrids among themselves. The F_1 hybrids of *T. vulgare* x *A. glaucum* have $2n = 42$ and at meiosis most of them have $10_{II} + 22_I$; the number of bivalents proves no greater in the self-fertile hybrids than in the sterile. In the *T. vulgare* x *A. elongatum* hybrids, where $2n = 56$, the usual number of bivalents is 14 but up to 21 have been observed in certain cases; the self-sterile hybrids mostly have only 14. The percentage of perennial forms in the F_2 and later generations varies in accordance with the variety of wheat serving as the original parent; it was greatest when the parent was a winter wheat, preferably one of the annual winter types derived from a *Triticum* x *Agropyron* hybrid. The hybrids from *A. elongatum* are more winter hardy than those from *A. glaucum* and by using the most fertile of the F_1 plants, in which 21 allosyndetic bivalents and up to 7 autosyndetic bivalents are present, F_3 families comprising up to 90% of perennial plants and F_3 generations with up to 30% are obtained.

The first two perennial wheats, 34085 and 23086, were produced by selection from the F_3 population of a cross (spring wheat *Lutescens* 062 x *A. glaucum*) x winter wheat Kooperatorka followed by two generations of selfing. Both varieties are described. The ripening of the grains starts at the tip of the ears and proceeds downwards, so the stems and leaves can still be used for hay after the grain has been reaped. In the Moscow area they produce grain in three successive years, the yields in 1940-42 being 18.2, 22.4 and 15.0 c. per ha. respectively. In Siberia they do not survive the winter, whereas in Kirgizia and Kazakhstan they give two grain crops a year in two successive years; in 1940-41 these amounted to 24.7 c. in spring, 2.8 c. in autumn, 23.5 c. next spring and 3.2 c. next autumn, making a total of 55.2 c. per ha. in the two years. In gluten content they exceed *Milturum* 0321, *Caesium* 0111 and all other standard wheats and although the flour is somewhat darker in colour than wheat flour it is otherwise equal in quality and pleasant in

flavour. Various defects are mentioned, among them the difficulty of threshing the grain. Further crosses, in which 34085 was pollinated with winter wheats, have given rise to a number of promising forms, including alternative wheats for Siberia, possessed of winter hardiness equal to that of the best winter wheats.

Perennial wheats 2 and 3 were produced from (*Lutescens* 0329 x *A. glaucum*) x *Erythro-spermum* 46/131 followed by two generations of selfing. They thresh more easily and their grain is better in quality than 34085, which they also surpass in winter hardiness. Both have $2n = 56$. They give grain in three successive years in the Moscow area. Their main defect at present is their relatively low self fertility and a low degree of fertility even under conditions of open pollination; further selection is being carried out in the hope of improving these features. Among the merits are high gluten content, a capacity to yield well on acid and alkaline soils, tolerance of high mineral dressings, winter hardiness and a tendency to give increasing yields from the first to the third year of growth.

286 (*Triticum-Agropyron hybrids*).
(pp. 289-312).

Certain errors in the Williams theory of rotations, such as the exclusion of winter cereals, are pointed out and the Mičurin doctrine of wide crossing is expounded as the basis of the author's work on the *Triticum* x *Agropyron* hybrids. Hybrid 599, produced by crossing a rye-wheat hybrid with *A. glaucum*, is responsive to manurial dressings and capable of yielding over 50 c. per ha. without lodging; it is free from shedding but threshes easily, is winter hardy and immune from bunt; with yields of round 30 c. per ha. on collective farms in the Moscow province it has outyielded the standard varieties such as 2453 by some 2 c. per ha.; in Alma-Ata with 15-21 c. per ha. it has exceeded *Ukrainka* by 4-8 c. and in Latvia with 31-54.4 c. per ha. it exceeded the Latvian standards by 7-15 c. Hybrid 186 has a very large grain, with a 1000 grain weight of up to 50 g., and being very strong in the straw is one of the best wheats for combining; it was produced from *Lutescens* 329 x *A. glaucum*. In tests in the Moscow province it has outyielded the standard varieties, especially on good land, by about 7 c., with yields of some 35 c. per ha. In Kazakhstan it has beaten *Novoukrainka*.

Hybrid 1 arose by crossing perennial hybrid 30485 with a Swedish winter wheat. It excels the two foregoing in standing capacity and in

number of grains per ear; it bears 6-7 grains per spikelet and may produce up to 9, the total number of grains per ear being 120 on good land, where its yields have been from 30 to 40 c. per ha.

Among the spring hybrids 2285 is mentioned particularly, having given up to 54 c. of grain, without lodging, in the Moscow province, the grain being of exceptionally high quality. Flora 6 is distinguished by high drought resistance.

Of the perennial hybrids, No. 2 receives special mention for high resistance to smut and bunt, freedom from lodging even in wet years, freedom from shedding, and protein contents of 22-25% in the grain, which threshes easily. In experiments in 1950 it gave yields of 14.8 c. of grain in spring and 18 c. of hay in autumn or alternatively 35 c. of hay in spring and 8.2 c. of grain later in the year. Its main defects are a reduction of yield in the second and third years, and insufficient winter hardiness and fertility.

287 (*Branching winter rye*). (pp. 313-22).

Two plants with branching ears were selected from a population of Omka growing in the vicinity of several varieties of winter rye and were grown together under isolation; the branching plants in the progeny were inter-pollinated and gave rise to a fairly homogeneous population of plants with branched ears, free from lodging and shedding and distinguished by high yield. The ears contain up to 317 grains, which, however, are uneven in size and selection for greater uniformity is in progress. The plants bear 7-11 ears each even in normal dense sowings. Some of the ears are branched after the fashion of branched wheat, while others are similar to cocksfoot in form.

288 (*New varieties of winter wheat*). (pp. 323-48).

The cultivation of winter wheat in the Moscow province is gradually extending, one of the most successful varieties being *Triticum x Agropyron* hybrid 186, with yields varying between 25 and 42 c. per ha.; 599 has given yields from 28 to 44 c. and No. 1 from 27.7 to 34.2 c. per ha., the best standard varieties such as Harjkov 917 and Moscow 2453 having given an average yield of 24.8 c., with a maximum of 35-38 c. per ha. The varieties are described (cf. Abst. 286), indications are given as to the best methods of growing them, and some results obtained with them on various collective farms are reported. Several of the new hybrids have outyielded 599 in experimental plots.

289 (*Experiments on creating perennial wheat*). (pp. 349-63).

Some of the early work on these hybrids is recalled (cf. Abst. 285). In experimental plots in Latvia No. 1 yielded up to 71 c. per ha. in dense sowings in 1951. No. 2 has 25-27 spikelets per ear and occasionally up to 35 and its grain contains up to 25% protein. Some plants have produced grain in three successive years and come up again in the fourth; each year a crop of hay is taken in the autumn after the grain has been reaped. Under unfavourable conditions for grain formation the process can be reversed, taking the hay crop first and allowing the grain to develop later.

290 (*Some promising factors in the yield of cereals*). (pp. 364-76).

Some of the new perennial wheats bear up to 33 grains per ear; the hybrids with *Elymus* spp. are also promising in this respect. Several forms with branched ears have occurred among the *Triticum x Agropyron* hybrids; some of these are interesting also in respect of number of grains, which may be as many as 17 per spikelet, with 2 grains per floret.

291 (*Elymus and its biological properties*). (pp. 377-89).

Reference is made to various hybrids of *E. giganteus* and *E. arenarius* with species of *Hordeum* and *Triticum*. Anatomical observations on pollen and embryo sac development showed it to be normal in both *Elymus* species. *E. giganteus* is almost exclusively cross fertilized and its pollen retains its viability for 3-4 days, as compared with 4-6 hours in *E. arenarius*, in which up to 60% sets were obtained from self pollination. Some plants of *E. giganteus* have up to 700-800 grains per ear and this, together with the branched ears that occasionally occur, is thought to be a promising feature for breeding purposes.

292 (*Winter wheat on collective-farm fields in the Moscow province*). (pp. 390-97).

Reference is made to the popularity of hybrid 599 in 1952; it is surpassed in yielding and standing capacity and in size of grain by 186, which is 5-6 days earlier and awnless. No. 1 is specially suited for the richer moister soils and in Latvia has produced 72 c. per ha. without lodging.

293 (*Experiments on wide vegetative and sexual hybridization in plants*). (pp. 398-422).

See PBA, Vol. XXIII, Abst. 3076.

294 (*New varieties of wheat*). (pp. 423-28).

See PBA, Vol. XXIV, Abst. 199.

- 295 **Exposure to radiation from atomic pile used to get better resistance to rust in Lee wheat, Ajax oats.**
What's New Crops Soils 1955 : 7 : No. 8 : p. 31.

At the University of Minnesota, exposure of the wheat variety Lee and the oat variety Ajax to irradiation from an atomic pile has resulted in the production of a strain of the former with resistance to race 15B of stem rust and of the latter with resistance to race 8 of stem rust. No other differences from the normal varieties have been detected so far.

- 296 FESENKO, N. V.
(Characteristics of the development of sex cells in self-pollinating cereals).
Agrobiologija (Agrobiology) 1955 : No. 3 : 124-28. [Russian].

Plants of the wheat Diamant [Diamond] and the barley Viner formed defective pollen when given photoperiods of 2-4 hours and 2-6 hours respectively. The female reproductive organs developed normally under the short-day conditions and set grains when pollinated with viable pollen.

- 297 ROSS, W. M. & MILLER, J. D.
A comparison of hill and conventional yield tests using oats and spring barley.
Agron. J. 1955 : 47 : 253-55.

In comparisons of varietal yields of oats and spring barley in hill tests, rod rows and drill plots at Hays, Kans., yields differed significantly according to method seven out of nine times, variability in the hill tests always being greater than in other methods. Barley yields varied more in the hill tests than oat yields. It is considered that hill yield tests for small grains are of use only as a supplement to other methods.

- 298 TAMM, E. & SCHENDEL, U.
Der Gefässversuch als Mittel zur Feststellung der Standortansprüche von acht Sommerweizen- und acht Hafersorten an die Wasser- und Nährstoffversorgung.
(The pot experiment as a means of determining the environmental requirements of eight spring wheat and eight oat varieties as regards water and plant nutrient supply).
Z. Acker- u. PflBau. 1955 : 99 : 427-62.

The effect of varying amounts of water and of three different levels of plant nutrients on the straw and grain yields of eight spring wheat and eight oat varieties was tested at the Faculty of Agriculture of the Technical University of

Berlin to obtain information on varietal differences in ability to utilize nutrients present in the soil, the effect on this ability of the moisture content of the soil and the most suitable external conditions for the cultivation of each variety. The fertilizer used was a mixture of ammonium nitrate, calcium phosphate and potassium sulphate. It was found that the order in which the varieties were placed, either according to their yields of grain or of straw, varied considerably, depending on the different treatments to which they were subjected. Janetzki's früher Sommerweizen [Janetzki's Early spring wheat], for example, produced high yields of grain when given medium amounts of water and fertilizer, but the straw yield was low compared with that of the other wheat varieties tested. The same amount of fertilizer, combined with an increase in the amount of water given, resulted in much higher yields of straw but had no marked effect upon grain yield. An increase in the amount of fertilizer, if the water content of the soil was not also increased, led to a reduction in the yield of both straw and grain. Lohmann's Weendner Sommerweizen [Lohmann's Wendish spring wheat] also reacted favourably to increased amounts of fertilizer only when the moisture content of the soil was also correspondingly increased. The straw and grain yield of the oat variety Ebstorfer Braun [Ebstorf Brown], on the other hand, was increased by a higher level of fertilizer irrespective of whether or not the amount of water in the soil was increased. Further varieties tested along the lines described above comprised the wheat varieties Koga II, Rimpaus Langensteiner, von Rümcker's früher Dickkopf [von Rümcker's Early Squarehead], Peragis II, Carstens and Strubes roter Schlandstedter Sommerweizen [Strube's Red Schlanstedt spring wheat] and the oat varieties Flämingsgold, Flämingstreue, Eckendorfer früher Borriesa Hafer [Eckendorf Early Borriesa oats], Carstens VII, von Kalbe Vienauer, Peragis früher II [Peragis Early II] and Heines Gold.

- 299 OVEČKA, V.
Nově vyšlechtěné výnosnější odrůdy ječmene a kukuřice. **(Recently developed productive varieties of barley and maize).**

Za socialist. Zeměd. 1955 : 5 : 1097-105.
Recent selections from Valtice include Pavlovický, a four-rowed forage variety of winter barley distinguished by high yield, hardiness and resistance to lodging, and a maize hybrid Valtice x Hodoninský Koňský Zub Žlutý [Hodonin Yellow Dent] which in recent

trials has surpassed all other varieties in grain and forage yield by a good margin.

- 300 BRUEHL, G. W. & TOKO, H.
A Washington strain of the cereal yellow dwarf virus.

Plant Dis. Repr. 1955 : 39 : 547-49.

A strain found in Washington differs from the Californian strain in the reaction it produces in the wheat Baart 46, the oat variety Kanota and the barleys Atlas 46 and Rojo. On other varieties the two strains produced similar symptoms (cf. *PBA*, Vol. XXIII, Abst. 2686).

WHEAT

- 301 TRENTIN, A.
Sperimentazione granaria nei paesi del Bacino Mediterraneo. (**Wheat experimentation in the countries of the Mediterranean Basin**).

Agricoltura d. Venezie 1955 : 9 : 341-52.

The results of a coordinated series of wheat trials in Italy, north Africa, Israel and Spain are presented. Highest yields were obtained from Funo, Florau, Mentana x *Aegilops ovata* E and Pirana soft wheats and Russello and Cappelli hard wheats. The earliest soft wheat was Agrella 1. The most rust-resistant soft wheats were Roma and Giza 135 and 139; the most resistant hard wheat was Russello.

- 302 ZETA
Il nuovo frumento "Loro." (**The new wheat Loro**).
Ital. agric. 1955 : 92 : p. 374.

The wheat Loro is the product of an excellent ear found by an Italian peasant of that name. The field in which it was found was sown with improved seed originating from the Bologna plant breeding station (cf. Abst. 303).

- 303 MALIANI, C.
Il frumento "Loro." (**Loro wheat**).
G. Agric. Domen. 1955 : 65 : p. 220.

A description of the new variety Loro is given. It was selected by a farmer from a field of the variety Fortunato near Bologna. The new variety has spikes appreciably larger than those of S. Pastore 14; the glumes are covered with dense hairs; floral fertility is high (cf. Abst. 302).

- 304 BONVICINI, M.
Il grano di Ca' Morosini nelle dichiarazioni di Bonvicini. (**The wheat from Ca' Morosini according to declarations of Bonvicini**).

G. Agric. Domen. 1955 : 65 : p. 229.

Correspondence from M. Bonvicini is published

with reference to the wheat Loro (cf. Absts. 302-03) which, it is claimed, has been identified as a hybrid of Florio x Lauro Bassi, produced at the Bologna plant breeding institute but not released on account of its having certain defects and not displaying any real superiority in yield over other varieties such as Funo and Fortunato.

- 305 Forsøg med hvedesorter 1950-53.
(**Trials of wheat varieties, 1950-53**).
Tidsskr. Planteavl 1955 : 59 : 162-65.

Of ten varieties tested at ten stations in Denmark, Nord Desprez proved to have the highest yield and strongest straw.

- 306 Wintertarwe, 1955. (**Winter wheat, 1955**).
Landbouwwoorlichting 12 : Bijl. 11; Ber. Rassenkeuze 1955 : No. 190 : Pp. 6.

Comprehensive tabulated data are presented on the relative yields and winter hardiness of 23 winter wheats tested on 7 different types of soil in the Netherlands in 1955. Heine's VII, Carsten VI and Panter combined high yields with a good degree of winter hardiness. Higher yields than those obtained from the three above-mentioned varieties were produced by Minister and Cappelle Desprez, but these varieties lacked winter hardiness.

- 307 REITZ, L. P.
Responses of hard winter wheat varieties in regional tests.
Diss. Abstr. 1955 : 15 : Publ. No. 11,995 : p. 947. (Abst.).

From an analysis of the results of uniform regional trials of about 30 varieties held at 13 stations in the Plains area, USA, over the period 1932-53, it is concluded that such trials may be validly used in determining the yield and area of adaptation of varieties. A regional average obtained from several trials within an ecological zone obviates the need for lengthy trials at any one station.

- 308 MALIANI, C.
Il nuovissimo frumento "Roberto Forlani." (**The new wheat Roberto Forlani**).
Ital. agric. 1955 : 92 : 464-67.

The wheat described was produced by the late R. Forlani from a cross between Villa Glori and a branched wheat; it has a large awned ear, producing 6-8 grains per spikelet and up to 140 grains per ear. It is an alternative wheat of medium early maturity; it is resistant to cold, rust, smuts and mildew and on poor land in San Marino has yielded 30-49 q. of grain per ha.,

which is about double the average of the older varieties over the last five years. It tends to lodge on more fertile ground.

- 309 MILLER, J. D. & ROSS, W. M.
Relative yields of varieties of wheat on fallow and on cropland at Hays, Kans., 1921-52.

Agron. J. 1955 : 47 : 308-11.

A comparison was made between the yields of winter wheats grown on fallow and previously cropped land at Fort Hays, Kans., data for 25 years being available. The number of years in which the following interactions proved to be significant were as follows: replication within cropping method, 9; variety x method, 9; between the two methods, 18; and between varieties, 19. Correlations within years between average yields of all varieties on cropped land and fallow were significant in 20 of the 25 years. Intravarietal correlations for yields on cropped land and fallow were significant in each variety. When the varieties were grouped according to maturity, the yields of a given group on cropped land and fallow were closely related. The effects of rainfall and temperature were also analysed.

- 310 LUKJANENKO, P. P.
(Breeding and standardization of winter wheat varieties for different types of rotation).
Agrobiologija (Agrobiology) 1955 : No. 3 : 37-44. [Russian].

At Krasnodar new varieties, some doing well in succession to sunflower, others after fallow, have outyielded the standard Novoukrainka 83. The new lodging-resistant varieties Rannaja 27 [Early 27] (Novoukrainka 83 x Skorospelka L1 [Early L1]) and Bezostaja 4 [Awnless 4] (Lutescens 17 x Skorospelka L2) produced appreciably more grain than the standard after fallow, although their yield was below that of the standard on the land previously occupied by sunflower. Other varieties, notably Kolos 26 [Ear 26] showed yield increases over Novoukrainka 83 both after sunflower and after fallow, though the margin was narrow in each case.

- 311 KORNILOV, A. A.
(Methods of breeding hard wheats for high yield).
Zemledelie (Agriculture) 1955 : No. 7 : 68-76. [Russian].

In Kazakhstan, new varieties distinguished by long ear, good grain set and midseason or late maturity have been developed. They yield better than Melanopus 69 and other varieties bred for earliness and drought resistance,

characteristics which are regarded as negatively correlated with productiveness in hard wheats. Among the best new wheats are GVK-7 and GVK-8, from the cross Ak-Bidaï [White wheat] 630 x *Triticum dicoccum* x Ak-Bidaï; they were trained for two years upon rich moist soil under short photoperiods.

- 312 CIFERRI, R.
The first interspecific wheat hybrids.
J. Hered. 1955 : 46 : 81-83.

A summary is given of a paper by C. A. L. Bellardi on interspecific wheat hybrids, published in 1809 in *Ann. Agric. Regn. Ital.* 3 : 162-84.

- 313 IVANOVSKAJA, E. V.
(Structure of grains from a trigynous flower of a wheat-Agropyron hybrid).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 18 : 91-94. [Russian].

An anomalous flower with three apocarpous ovaries, each having a normally functioning ovule, is described.

- 314 NAKAJIMA, G.
[Cytological studies of F_1 plants of (*Triticum turgidum* x *Secale cereale* x *T. vulgare*) x *S. cereale*].
Senshokutai (Chromosome)/Kromosomo. 1953 : Nos. 17-19 : 617-24. [Japanese].

Two plants were obtained from the above cross, one with $2n = 30$ and the other with $2n = 46$; the modal numbers of bivalents were 4 and 19 respectively. The genome constitutions of the two plants are inferred to be $AB + (D-3) + R + (R-2) = 30$ and $AABB + (D-3) + RR = 46$.

- 315 OSBORNE, T. S. & ELLIOTT, F. C.
Chromosome translocations induced in *Triticum* x *Agropyron* hybrids by X rays, phosphorus³², and sulfur³⁵.
Amer. J. Bot. 1955 : 42 : 646-49.

The chromosome translocations occurring as a result of exposing F_0 caryopses from a cross between SH 198-4 (*A. elongatum* x *T. aestivum*) and the hexaploid spring wheat Idaed to X rays or to β rays from P³² or S³⁵ were estimated from the numbers of multivalents occurring in the pollen mother cells. The β rays produced little or no effect, while X irradiation with 12,000-20,000 r. doubled or trebled the number of interchanges. Irradiation with 12,000-14,000 r. gave an interchange frequency of 0.40 per pollen mother cell; followed by storage in oxygen, the same dosage gave a frequency of 0.61 interchanges.

- 316 BELL, G. D. H., LUPTON, M. & RILEY, R. **Investigations in the Triticinae. III. The morphology and field behaviour of the A_2 generation of interspecific and intergeneric amphidiploids.**

J. agric. Sci. 1955 : 46 : 199-231.

"In general the juvenile growth of interspecific *Triticum* and intergeneric *Triticum-Aegilops* amphidiploids was normal and did not deviate from the parental behaviour [in investigations at the Plant Breeding Institute, Cambridge, England]. However, in the case of the interspecific hexaploids derived from *T. monococcum* and *T. aegilopoides* there was an early check in growth, and all the amphidiploids derived from *A. caudata* developed more or less severe chlorosis. "Most amphidiploids were intermediate between their parents in mature plant characters. However, in the hexaploid *Triticum* interspecific amphidiploids there was a transgressive increase in plant height, and whilst the derivatives of *Triticum* x *Aegilops* crosses fell within the range of the parents, they were closer to one or other parent depending upon the *Aegilops* species involved.

"The ear morphology of the *Triticum* interspecific amphidiploid was generally a composite of that of the parents, the influence of each parent being detectable. In the *Triticum-Aegilops* amphidiploids, however, ear morphology was so strongly influenced by the *Aegilops* species, that there was frequently no obvious difference between the ears of amphidiploids with a common *Aegilops* parent but different wheat parents.

"The fertility of the amphidiploids was low and there was no significant correlation between the fertility of amphidiploids and parents. There was a significant correlation between both the grain weight, and number of spikelets per ear, in parents and amphidiploids, but whilst the mean grain weight was about that of the parent with the heavier grain, the mean of spikelets per ear was about that of the parent with the fewer spikelets" (cf. *PBA*, Vol. XXIII, Abst. 1859). [Authors' summary].

- 317 MELETTI, P.

Il problema del "Denti de cani" in Sardegna. Contributo alle conoscenze sull'origine di un *Triticum* esaploide. (The problem of the Denti de cani in Sardinia. A contribution to our knowledge concerning the origin of a hexaploid *Triticum*).

Caryologia 1955 : 7 : 98-113.

The wheat known in Sardinia as Denti de cani [Dog-teeth] grows as a weed in fields of *Triticum*

durum. Caryological studies here reported show it to have $2n = 42$; the idiogram is described and depicted, together with that of *T. durum* 'Cappelli'. Marked resemblances were noted between 28 of the chromosomes of Denti de cani and those of Cappelli, and the suggestion is made that the Denti de cani wheats are allopolyploid hybrids between tetraploid wheats and some diploid member of the Triticineae growing wild in Sardinia, possibly *Aegilops caudata* or *Haynaldia villosa*.

- 318 BELL, G. D. H. & LUPTON, F. G. H. **Investigations in the Triticinae. IV. Disease reactions of species of *Triticum* and *Aegilops* and of amphidiploids between them.**

J. agric. Sci. 1955 : 46 : 232-46.

"Observations have been made of the seedling reactions of species of *Triticum* and *Aegilops* and of amphidiploids between them to races of *Puccinia glumarum*, *P. triticea*, *P. graminis* and *Erysiphe graminis*. These observations have been compared with field observations on mature plants. The work on *P. graminis* and much of that on *P. triticea* was carried out by Dr. R. C. McGinnis of the Dominion Rust Research Laboratories, Winnipeg, Canada.

"Seedling and mature plant resistance to *P. glumarum* has been found in *Triticum monococcum*, *Aegilops caudata* and *A. ovata*. Resistance was not shown by amphidiploids of *T. monococcum* and *A. caudata* with susceptible species of *Triticum*, but was shown by some amphidiploids involving *A. ovata*; *T. timopheevi* and *A. speltoides* were susceptible to certain races as seedlings but resistant as mature plants in the field.

"Seedling resistance to all the races of *P. triticea* used in these investigations was shown by *A. caudata* and resistance to certain races by certain other species. Amphidiploids involving *A. caudata* were resistant to all races, but other amphidiploids were resistant to some races and susceptible to others.

"Seedling and mature plant resistance to *P. graminis* was shown by *A. caudata*. *A. ovata* and *A. speltoides* were resistant as mature plants, and only slightly infected as seedlings. None of the amphidiploids tested was completely resistant at the seedling stage; certain amphidiploids involving these three species were, however, only slightly infected as mature plants, and may be useful as sources of resistance to race 15B.

"Resistance to *E. graminis* was shown by *T. carthlicum*, *T. dicoccum*, *T. timopheevi* and by

numerous species of *Aegilops*. Amphidiploids of *T. carthlicum*, *T. dicoccum*, *T. timopheevi* and *A. caudata* with diploid wheat species were resistant to *E. graminis*, but those with susceptible tetraploid wheats were susceptible. Other intergeneric amphidiploids (with two exceptions) were resistant" (cf. Abst. 316).

[Authors' summary].

- 319 UNRAU, J.
Cytogenetic effects of 2,4-D on cereals.
Ann. Rep. Canad. Seed Gr. Ass. 1953-1954 : 37-39.

Of 150 progenies obtained after treatment of the wheat Thatcher with 2,4-D at the University of Alberta, 117 were morphologically indistinguishable from Thatcher but differed, in some cases significantly, in yield and protein content. Some F_2 plants showed chromosomal aberrations and segregated in the F_3 for ear abnormalities, height, earliness and degree of awning.

- 320 KALINENKO, I. G.
(A new form of wheat).
Dokl. Akad. sel'skokožjaistv. Nauk Lenin. (Proc. Lenin Acad. agric. Sci.) 1955 : No. 1 : 25-28. [Russian].

A wheat with 42 chromosomes, dissimilar in habit and morphological characters to any species from the wheat collection of the Institute of Plant Industry, is described. It was obtained at Odessa from the spring wheat *Lutescens* 1163 that had been trained for winter habit and branched ear. The inheritance of the initial variety was shattered by sowing it in late autumn and by removing entire tillers and portions of some ears from each plant to ensure a good flow of nutrients to the central florets of the few ears left intact. The new form is distinguishable morphologically from the normal winter type of *Lutescens* 1163, which was obtained by the same method. It shows resistance to rust and mildew and crosses with soft winter wheats.

- 321 IVANOV, A. P.
(Rye grains found in the ears of a winter wheat).
Dokl. Akad. sel'skokožjaistv. Nauk Lenin. (Proc. Lenin Acad. agric. Sci.) 1955 : No. 2 : 23-25. [Russian].

A wheat population from Nagornyĭ Karabah with some rye grains in the ears was investigated at the Institute of Plant Industry. The phenomenon is attributed to interspecific conversion.

- 322 OINUMA, T.
(Caryomorphology of cereals. XIII. On parallel variation in genome and caryotype in *Triticum* and on the order of appearance of the different genomes as shown by their caryotypes).

Senshokutai (Chromosome)/Kromosomo 1953 : Nos. 17-19 : 607-11. [Japanese].

Caryotype analyses of representatives of *T. monococcum*, *T. dicoccum*, *T. durum*, *T. spelta* and *T. aestivum* are reported. The caryotypes of the A, B and D genomes are constant irrespective of the species in which they occur. The B genome is regarded as morphologically the most simple and as the earliest to have evolved.

- 323 MEDVEDEVA, G. B.
(The question of biparentage in wheats).
Dokl. Akad. Nauk SSSR (Proc. Acad. Sci. USSR) 1955 : 101 : 1125-26. [Russian].

An account is given of experiments with soft and hard wheats respectively in which a variety was fertilized by the pollen of two others; the resulting F_1 plants were analysed for their ear and grain characters. Data are presented showing that a number of multiparental crosses gave progenies combining the characteristics of two pollen parents. Among the soft wheats the highest percentage of hybrids combining characters from both pollinators was obtained when *Albidum* 26805 was fertilized by the pollen of *Ukrainka* and *Alborubrum* 2671; of the crosses involving hard wheats, *Hordeiforme* 432 x *Candicans* 75/09 + *Apulicum* 964 gave most multiparental hybrids.

- 324 MARTÍN VARGAS, V.
La calidad panadera de algunos trigos Americanos cultivados en Toledo. (The bread-making quality of some American wheats cultivated in Toledo).
Bol. Inst. Invest. agron., Madr. 1955 : 15 : No. 32 : 73-93.

Farinograph, fermentograph and alveograph recordings and baking tests are reported for seven standard American wheat varieties introduced into Spain from the USA.

- 325 DE MIRANDA, H.
De bakkwaliteit van de in Nederland verbouwde tarwerassen. (The baking quality of wheat varieties grown in the Netherlands).
Vijfde Cocobro-Jaarbje. 1955 : 59-65.

Data on the baking quality of 9 winter and 4

spring varieties are presented. The new spring wheat Weibull 4138 gave highly satisfactory results and this variety, together with CB46-110, was found to possess good resistance to sprouting.

- 326 AVILA, A. & MIKENBERG, N.
Estudio de la correlación posible entre las propiedades físicas y principales constituyentes químicos del gluten.
(Study of the possible correlation between the physical properties and principal chemical constituents of the gluten).
Rev. Invest. agríc. B. Aires 1951 : 5 : 393-423.

The content of various protein fractions, Pelshenke fermentation time, percentage moisture of the gluten and expansion index of the flour of 99 Argentine wheat varieties were determined. Data were also collected on grain weight, volume, colour and consistency. A positive correlation of $r = 0.83$ was found between Pelshenke fermentation time and expansion index.

- 327 **Milling and baking quality of wheat. Breeding better varieties.**
J. Dep. Agric. Vict. 1955 : 53 : 251-54.

In breeding in Victoria during the past 20 years, varieties have been developed showing higher yielding ability and disease resistance but less marked improvement in protein content and quality. Improvement in protein content and quality is being sought by crossing high-yielding local types with high-quality wheats from various sources, use of an especially promising modification (unspecified) of the back-cross technique and breeding for efficiency in utilization of soil N. It is expected that hybrids now under test will be superior to the older wheats not only in productivity but also protein content and quality. In conjunction with the programme of wheat breeding, improved strains of *Medicago* spp. and other legumes are being developed for introduction into the rotation as a means of raising the N level of certain soils.

- 328 MILLER, M. E.
Mill permits early measure of quality in new wheat varieties ; speeds selection.
What's New Crops Soils 1955 : 7 : No. 8 : p. 30.

An apparatus developed at Washington State College for testing 5 g. samples of wheat for milling quality enables about 600 samples to be tested in one day.

- 329 MATWEEF, M.
Sur la valeur industrielle de quelques blés tendres récemment introduits en Tunisie. (On the industrial value of some soft wheats recently introduced into Tunisia).
CR Acad. Agric. Fr. 1955 : No. 11 : 530-33.

Of varieties introduced into Tunisia in recent years, Florence x Aurore [Dawn] has proved the most acceptable to local farmers.

- 330 ATKINS, I. M. & NORRIS, M. J.
The influence of awns on yield and certain morphological characters of wheat.
Agron. J. 1955 : 47 : 218-20.

In a study of ten pairs of isogenic wheat lines at Denton, Tex., the members of each pair being genotypically and phenotypically identical but for the presence or absence of awns, the awned lines gave significantly higher yields, heavier kernels and higher test weights than the awnless. The differences were greater during drought years. Differences in numbers of kernels per head and in stand were not significant in single seasons, but were just significant when combined over several seasons.

- 331 ISOM, W. H.
The differential response of wheat varieties to different levels of nitrogen.
Diss. Abstr. 1955 : 15 : Publ. No. 11,905 : p. 929. (Abst.).

Among the varieties tested for two years at Ithaca, NY, intervarietal differences in response to nitrogen fertilizer treatment were slight in respect of height and competitive ability but were significant with regard to yield and test weight. Any one variety was, however, inconsistent in its response.

- 332 HOFMANN, E. & AMBERGER, A.
Die Wirkung der N-Düngung bei verschiedenen Winterweizen- (und Sommergersten-) Sorten. [The effect of nitrogen manuring on different winter wheat (and spring barley) varieties].
Z. PflBau. 1955 : 6 : 74-80.

Further to the trials reported in *PBA*, Vol. XXIV, Abst. 238, a series of experiments was carried out to determine the influence of nitrogen manuring on the baking quality of winter wheat varieties grown in Bavaria. It was found that only excessive nitrogen manuring had a detrimental effect upon the quality of the flour

produced and that this effect was most marked in varieties with a high protein content. The seven varieties tested were classified in the following order of decreasing protein content: Hauter, Tassilo, Taca, Erbachshofer, Walthari, Heine IV and Firlbeck.

- 333 SERGEEV, L. I.
(Tolerance of noxious climatic and soil conditions in plants).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 18 : 13-16. [Russian].

Lutescens 329 was among the wheat varieties that showed resistance to salinity and low temperatures. The tolerance of salinity of the hard wheat Melanopus 69 was improved by growing it for several generations on saline soil.

- 334 GAVRILOVA, N.
(Efficacy of intravarietal pollination of the wheat varieties 159 and 301).
Spis. nauč.-izsled. Inst. Minist. Zemed., Sofia 1953 : 20 : No. 1 : 69-72. [Bulgarian].

The effect of drought upon fertility of some Bulgarian wheats has been investigated. Variety 301 surpassed all others in resistance even though variety 14 was outstandingly drought resistant during the period when the sex cells are formed.

- 335 VAKLINOVA, S.
(A comparative study of drought resistance of standard and promising varieties of winter wheat during the formative phases).
Spis. nauč.-izsled. Inst. Minist. Zemed., Sofia 1953 : 20 : No. 3 : 111-22. [Bulgarian].

This article is an extended version of that summarized in Abst. 334.

- 336 BLJAHEROVA, R. & KINS, A.
(Correct organization of seed production—a source of increased yield).
Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955 : No. 8 : 11-12. [Russian].

Mention is made of the wheat Moskovka which has superseded Lutescens 62 as a spring standard in some nonchernozem provinces. It is superior in yielding ability and resistance to lodging and shedding and its baking and milling properties are good.

- 337 GORTER, G. J. M. A.
Powdery mildew of wheat.
Fmg. in S. Afr. 1955 : 30 : 281-82.

The identity of the form (SA1) of *Erysiphe graminis* attacking wheat in the Transvaal has

not yet been established. As shown by the results of seedling infection, Klipkous and Wolkoring are immune from form SA1. Hope, Kleintrou [Little Faithful], Marina, Regent, Rooi Wol [Red Wool], Wolbaard [Woolly Beard] and *Triticum durum* are listed as very resistant.

- 338 DUFF, A. D. S.
Resistance to take all disease in Kenya wheat 131. II. Effect on yield.

E. Afr. agric. J. 1955 : 21 : 32-33.

Wheat 131 showed no appreciable reduction in yield as the result of severe attack by take-all (*Ophiobolus graminis*) whereas under the same conditions the susceptible variety Kenya Governor suffered a 48.5% reduction (cf. *PBA*, Vol. XXV, Abst. 1887).

- 339 New red-chaffed wheat for the North-west possesses stronger resistance to smut.

What's New Crops Soils 1955 : 7 : No. 9 : p. 28.

A new soft white winter wheat, Elgin-19 x Elmar, has been developed at Pullman, Wash. Intended for use in the Pacific Northwest, it carries the Rex and Rio factors for resistance to common and dwarf smut.

- 340 JAHTENFELJD, P.
(What kind of research is carried on at the Siberian Cereal Scientific Research Institute).

Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955 : No. 9 : 43-45. [Russian].

A brief account of breeding work on cereals, potatoes and forage plants at Omsk mentions the following new spring wheats.

Omsk 2078 (Milturum 290 x Udarnica [Shock Worker]) is as early-maturing as Lutescens 62 and shows superior resistance to smut, rust and lodging. It produces high quality flour. Černokoloska [Black Ear] is a large-grained hard wheat distinguished by high protein and gluten contents. As a macaroni wheat, it excels Hordeiforme 10. Reference is made to a new soft wheat with vitreous grain equal in quality to a hard wheat. It was obtained by crossing the soft wheat Smena [Change] with the hard wheat Hordeiforme 33/71.

- 341 MURAVJEV, V. P. & POLIŠČUK, V. K.
(Improving the resistance of winter wheat to bunt).

Zemledelie (Agriculture) 1955 : No. 6 : 108-10. [Russian].

Intervarietal hybrids obtained by restricted open pollination of Lutescens 17 with some wheats of var. *erythrospermum* showed a higher

degree of resistance to bunt than the ♀ parent. Resistance was improved by selecting resistant types under conditions of severe infection. Awnless hybrids resembling *Lutescens* 17 were more susceptible to disease than awned forms with the morphological characteristics of the *erythrospermum* pollen parent.

- 342 BASILE, R., LEONORI-OSSICINI, A. & ROSA, M.
Identificazione di razze fisiologiche di *Puccinia triticea* Erikss. in Italia. (Identification of physiological races of *P. triticea* Erikss. in Italy).
Boll. Staz. Pat. veg. Roma 1954 : 12 : 21-28.

The 8 races described include two which are reported for the first time in Europe, viz. races 63 and 111; two others seem to be new altogether.

- 343 BASILE, R., LEONORI-OSSICINI, A. & ROSA, M.
Identificazione di razze fisiologiche di *Puccinia graminis tritici* Erikss. et Henn. in Italia. (Identification of physiological races of *P. graminis tritici* Erikss. et Henn. in Italy).
Ann. Sper. agr. 1955 : 9 : No. 4 : Suppl. i-v; and Boll. Staz. Pat. veg. Roma 1954 : 12 : 29-33.

Of the 10 races now identified (cf. *PBA*, Vol. XXV, Abst. 102), 7 are hitherto unknown; one of them attacks Khapli rather severely, one fails to attack Little Club and another gives strong infections on both Kota and Arnautka.

- 344 THORPE, H. C. & DUFF, A. D. S.
A note on the appearance of two new stem rust forms in East Africa.
E. Afr. agric. J. 1955 : 21 : p. 61.

Two new races, K13 and K14, originating on the commercial wheats 360H and R64 respectively, have been discovered. K14 is expected to cause considerable damage in the next few years. Since some of the promising new varieties at present being multiplied have been attacked by K14, the breeding programme will require revision. K13 appears to be less virulent.

- 345 HEERMANN, R. M.
Inheritance of stem rust reaction in durum and emmer crosses with particular reference to race 15B.
Diss. Abstr. 1955 : 15 : Publ. No. 11,090 : 312-13.

Seedling resistance in Khapli emmer is controlled by two dominant factors *A* and *B*; in the *Triticum durum* wheats CI 3255 and PI 94701 by a partially dominant factor *E*¹; and in the

T. durum variety RL1714 by the nearly recessive allele *e*. *A*, *B* and the *E* alleles were independently inherited.

Adult resistance in Khapli emmer is controlled by four factors: *A* and *B*, which are the same as or closely linked to the *A* and *B* factors for seedling resistance, and *c* and *d*, which are not expressed in the seedling stage. The dominant *C* from Stewart was partially epistatic to *A* and *B*, while *D* had an additive effect for susceptibility with *A*, was partially epistatic to *A* and had no effect in the expression of *B*. The inheritance of adult resistance in the *T. durum* wheats was the same as that of seedling reaction. The *E* factors are not allelic with any of the factors from Khapli emmer.

- 346 PLESSERS, A. G.
The genetics of stem and leaf rust reactions and other characters in crosses of Lee wheat with Chinese monosomic testers.
Diss. Abstr. 1955 : 15 : Publ. No. 11,114 : p. 323.

The resistance of Lee (Hope x Timstein) to leaf rust was found to be partially dominant for races 5, 35 and 16, partially recessive for races 15 and 9 and recessive for race 126. Three main interacting genes are thought to be involved. A gene for resistance appears to lie on chromosome V and there are indications that chromosomes II, IV and XIV each carry a gene or modifier for resistance to races 5 and 15, race 9 and race 126 respectively.

The resistance of Lee to stem rust has been described elsewhere (cf. *PBA*, Vol. XXV, Abst. 814).

Genes promoting awn development were present on chromosomes V, VIII and X, and genes inhibiting awn development on chromosomes II, XIII and XX. The monosomic hybrids VIII and X had shorter spike internodes than normal F₁ plants; monosomic hybrids X and III deviated significantly from normal hybrids in number of internodes and X in the length of the beak of the glumes. The monosomic hybrid IX showed speltoid characters.

- 347 MARTÍNEZ, E. J.
Estimación de los daños causados por las royas de los cereales (*Puccinia triticea* y *Puccinia coronata avenae*). [Estimation of the damage caused by the cereal rusts (*P. triticea* and *P. coronata avenae*)].
Rev. Invest. agric. B. Aires 1951 : 5 : 465-82.

Tables showing the loss in yield caused by *P.*

coronata attacking Richland oats and *P. triticina* and *P. glumarum* attacking a series of eight wheat varieties under controlled conditions during 1948-49 at the Castelar Plant Breeding Institute are presented.

- 348 CAMPBELL, A. B.
A monosomic analysis of Redman wheat for stem rust resistance.
 Diss. Abstr. 1954 : 14 : Publ. No. 8446 : p. 1131.

Data obtained from crosses of Redman with 21 different monosomics of Chinese Spring at the University of Minnesota have led to the tentative conclusion that two complementary factors, situated in chromosomes III and V respectively, are involved in the adult-plant resistance of Redman to stem rust.

- 349 MARINIČ, P.
(New varieties of winter crops).
 Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955 : No. 7 : p. 21. [Russian].

A number of winter wheats recently made standards in the USSR are described. Most are distinguished by high yield, large grain and good baking and milling properties, Hybrid 481 from Stavropolj being a strong wheat. They show resistance to lodging and diseases, notably rusts. Belocerkovskaja 198 (*Erythrospermum* 15 x Koveil) surpasses *Lutescens* 17 in drought-resistance, and *Milturum* 513 from Smolensk and *Pergale* from the Lithuanian State Breeding Station is hardier and less susceptible to lodging than the respective previous standards.

- 350 EKBOTE, R. B. & GOKHALE, V. P.
Rust resistant wheats for Madhya Pradesh. I. Breeding material.
 Indian J. Genet. 1954 : 14 : 68-73.

Data are given on the seedling and adult reaction of introduced strains and varieties to ten races of stem rust at the Mahabaleshwar Wheat Rust Research Station, Bombay. NP790 is nearly immune and the *Triticum durum* variety Gaza is highly resistant to all ten races; other varieties show various degrees of resistance. The introductions are being crossed with rust-tolerant indigenous varieties to produce rust-resistant hybrids suited to local conditions.

- 351 LE TOURNEAU, D. J.
Catalase activity and chlorophyll content of several species of *Triticum* in relation to their resistance to *Puccinia graminis tritici*.
 Diss. Abstr. 1955 : 15 : Publ. No. 11,099 : 322-23.

Within any one of the species studied, varieties

susceptible to the above pathogen tended to have greater catalase activity in the leaves and equal or greater chlorophyll content than resistant varieties, high catalase activity being correlated with high chlorophyll content in some varieties of *T. dicoccum* and *T. vulgare*.

BUCKWHEAT

- 352 ŽEBRAK, A. R.
(Experimental production of inter-varietal amphidiploids of buckwheat).
 Dokl. Akad. Nauk SSSR (Proc. Acad. Sci. USSR) 1955 : 101 : 1121-24. [Russian].

The substance of this paper has been summarized in *PBA*, Vol. XXV, Abst. 2959.

OATS

- 353 FREY, K. J.
Agonomic mutations in oats induced by X-ray treatment.
 Agron. J. 1955 : 47 : 207-10.

This paper is a fuller version of the article summarized in *PBA*, Vol. XXIV, Abst. 1893, and includes data on the yield, test weight, heading date, plant height, lodging and stem-rust reaction of a few of the 61 mutants tested.

- 354 COFFMAN, F. A.
***Avena sativa* L., probably of Asiatic origin.**
 Agron. J. 1955 : 47 : p. 281.

It is pointed out that since the *A. sativa*-like varieties Fulghum and Columbia arose from a variety of the polymorphous species *A. byzantina* after its introduction to North America, *A. sativa* itself may have originated in a similar manner when *A. byzantina* was brought by Slavonic migrants from the Middle East to the cooler climate of Europe.

- 355 MARTINOLI, G.
Citotassonomia di alcune specie del genere *Avena* della Sardegna. (Cytotaxonomy of some species of the genus *Avena* from Sardinia).
 Caryologia 1955 : 7 : 191-204.

Descriptions and illustrations of the caryograms of three Sardinian species are presented. In *A. barbata* and *A. sterilis* $2n = 28$ and in *A. fatua* $2n = 42$. No form of *A. sterilis* with $2n = 42$ as reported by previous authors has yet been found in Sardinia.

- 356 JOSHI, A. B. & HOWARD, H. W.
Meiotic irregularities in hexaploid oats. IV. Hybrids between *Avena sativa* (spring and winter varieties), *A. fatua*, *A. sterilis*, *A. byzantina* and *A. nuda*.

J. agric. Sci. 1955 : 46 : 183-90.

"Pollen mother cells with irregularities of meiosis were rare in the parent species and varieties being usually less than 0.5% and the highest found being only 1.57% in the variety Grey Winter.

"F₁ *A. fatua* C.S.473 (from Afghanistan) x Grey Winter had 33.5% of pollen mother cells with irregularities. On the other hand, the F₁ hybrids of *A. fatua* C.S.46 (from Asia Minor) x both spring and winter varieties of *A. sativa* showed between 2.45 and 12.81% of irregular cells and were thus more regular than F₁ spring variety of *A. sativa* x Grey Winter.

"F₁ *A. sterilis* x spring and winter varieties of *A. sativa* showed between 5.56 and 6.67% of cells with irregularities of meiosis.

"F₁ *A. fatua* C.S.46 x *A. sterilis* and F₁ *A. nuda* x *A. sterilis* had 5.65 and 7.60% of irregular cells respectively, but F₁ *A. nuda* x *A. fatua* C.S.46 had 46.05%.

"All F₁ hybrids with *A. byzantina* as one parent had high frequencies of pollen mother cells (from 59.12 to 88.45%).

"The commonest irregularity of meiosis was the occurrence of univalents. Multivalents were found at a high frequency only in the *A. byzantina* hybrids. Bridges and fragments were uncommon, occurring in not more than 2% of cells.

"The limitations of the cytological results in assessing the relationships between the different hexaploid species of oats are discussed. It would, however, appear that there is a close relationship between *A. sativa* (both spring and winter varieties), *A. fatua* C.S.46 and *A. sterilis*, but that *A. byzantina* is not closely related to that group.

"The importance of the results to the plant breeder is briefly indicated." (cf. *PBA*, Vol. XXV, Abst. 1924). [Authors' summary].

- 357 WIGGANS, S. C. & FREY, K. J.
The effect of increased daylengths on the production of greenhouse grown oats.

Agron. J. 1955 : 47 : p. 387.

Experiments at Iowa State College to determine the optimum temperature and photoperiodic requirements for inducing oat plants to mature in the shortest possible time are described. The

best results were obtained with a photoperiod of 18-24 hr. at a temperature of 70° F. With a 24 hr. photoperiod it was found possible to grow four back-cross generations in one year, each plant producing 8-24 florets.

- 358 GRASSO, V.
 Studio sulla genetica dei carboni della avena: *Ustilago avenae* e *U. levis*. (Study on the genetics of oat smuts, *U. avenae* and *U. levis*).
 Boll. Staz. Pat. veg. Roma 1954 : 12 : 115-26.

Studies of conjugation in collections of the two species made in Italy and the USA have shown the presence of the same two sexual groups in each.

- 359 KOO, F. K. S., MOORE, M. B., MYERS, W. M. & ROBERTS, B. J.
Inheritance of seedling reaction to races 7 and 8 of *Puccinia graminis avenae* Eriks. and Henn. at high temperature in three oat crosses.
 Agron. J. 1955 : 47 : 122-24.

The White Russian and Richland (or Rainbow) factors for stem-rust resistance together condition resistance at all temperatures to all known races, except 4, 6 and 13; the "Canadian" type of reaction to stem rust provides resistance at moderate temperatures to all races except 7A. A selection of [Landhafer x (Mindoo x Hajira-Joanette)] x Andrew, for convenience designated LMHJA, is homozygous for all three types of resistance. F₃ lines of crosses of LMHJA with Andrew, Clinton and Gopher were studied for the inheritance of seedling reaction to races 7 and 8, with a view to elucidating the genetic basis of the combined resistance of the White Russian and Richland types. Andrew is presumed to carry the Rainbow gene; Clinton contains a gene similar in behaviour to the White Russian type; Gopher has neither the White Russian nor Richland factor. The results indicated that LMHJA carried two closely linked factors, one for resistance to race 7 and the other for resistance to race 8, the former being the same or similar to the gene for resistance in Andrew and the latter the same or similar to the gene in Clinton. Possible explanations of the origin of the combination of the White Russian and Richland types of reaction are discussed. Varieties combining all three types of stem-rust resistance plus the Landhafer gene for crown-rust resistance are now being experimentally tested in Minnesota.

- 360 VALLEGA, J.
Herencia de la resistencia a "*Puccinia coronata avenae*" y "*P. graminis avenae*." (Inheritance of resistance to *P. coronata avenae* and *P. graminis avenae*).
Rev. Invest. agríc. B. Aires 1951 : 5 : 523-39.

Hybridization studies involving the oat varieties Santa Fe 1 (resistant to races 1, 55 and 56 of *P. coronata*) and Klein Mar [Sea] and Tama CI3502 (both resistant to races 1 and 45 of *P. coronata*, this characteristic being inherited from Victoria) are reported. Tama also shows resistance to races 3 and 7 of *P. graminis*, derived from Richmond. The segregation ratios indicated that (1) Santa Fe 1 carries a single dominant gene for resistance to races 1, 55 and 56 of *P. coronata*; (2) Klein Mar and Tama each carry a dominant gene for resistance to race 1 and another dominant gene for resistance to race 45 of *P. coronata*; and (3) Tama possesses a single dominant factor determining resistance to races 3 and 7 of *P. graminis*. The different genetical behaviour of resistance to races 1 and 45 of *P. coronata* as compared with that reported from the USA is attributed to differences in the respective biotypes of the two rust races. Segregates of Santa Fe 1 x Klein Mar resistant to the four races of *P. coronata* cited above have been obtained at the Santa Fe research station. At the Castelar plant breeding institute, in addition to the rust-resistant segregates just referred to, lines have been obtained from Santa Fe 1 x Tama resistant to the four races of *P. coronata* and also to races 3 and 7 of *P. graminis*; the agronomic characteristics of these lines, however, require improvement.

- 361 SIMONS, M. D.
The use of pathological techniques to distinguish genetically different sources of resistance to crown rust of oats.

Phytopathology 1955 : 45 : 410-13.

The following methods have proved successful in differentiating between the resistances of 13 different varieties: (1) growing resistant varieties under conditions of high temperature and high nitrogen supply, thus rendering some varieties susceptible; (2) testing plants for reaction to several races of the pathogen; (3) testing detached leaves for reaction to several races of the pathogen; and (4) treating plants with maleic hydrazide 30 and testing for reaction to race 202. Method (4) induced susceptibility in two resistant varieties. Treatment with DDT

had little or no effect on the reaction of any of the varieties to five races.

- 362 COFFMAN, F. A., MURPHY, H. C. & RODENHISER, H. A.
Three new oats from a single cross; and all of them look promising!
What's New Crops Soils 1955 : 7 : No. 9 : p. 22.

Waubay, Jackson and Clarion, three high-yielding selections developed from Clinton x Marion at Aberdeen, Idaho, are above average in test weight, groat percentage and straw strength. All three show some tolerance of the races of crown rust attacking Clinton and are resistant to stem-rust races 7 and 7A.

- 363 JONES, J. M., GRIFFITHS, D. J. & HOLDEN, J. H. W.
Varietal resistance in oats to attacks by the stem and bulb eelworm.
Plant Path. 1955 : 4 : 35-43.

Of eight varieties tested for resistance to *Ditylenchus dipsaci* in infested fields at Churchstoke, Montgomery, and Trelogan, Flintshire, Wales, Grey Winter, Early Grey Winter, Unique S81, S172, and the spring wheat S225 were resistant. Seedling resistance was incomplete, all the varieties showing similar degrees of infection.

RYE

- 364 Forsøg med rugsorter 1952-53. (Trials of rye varieties, 1952-53).
Tidsskr. Planteavl 1955 : 59 : 166-67.
This report has been summarized in *PBA*, Vol. XXV, Abst. 258.
- 365 Winterrogge, 1955. (Winter rye, 1955).
Landbouwwoorlichting 12 : Bijl. 11; Ber. Rassenkeuze 1955 : No. 191 : unpaginated.

The results of trials of six varieties on different types of soil in the Netherlands are presented. In general, Petkus and Dominant proved the most productive. Brief descriptions of all the varieties tested are included.

- 366 VETTEL, F. & PLARRE, W.
Mehrjährige Heterosisversuche mit Winterroggen. (Several years' experiments with heterosis in winter rye).
Z. Pflanzenz. 1955 : 34 : 233-48.

Experiments were carried out at the Hadmersleben Research Station, Germany, to investigate the possibilities of exploiting heterosis in rye on a commercial scale. A heterotic effect was evidenced by increased grain yields and more prolific tillering. Straw length was not

affected and data on increase in grain size due to heterosis were inconclusive. Considerable differences were observed in the combining ability of the different varieties tested. Inbred lines obtained from closely-related varieties did not display such a marked heterotic effect, when crossed, as lines derived from distantly-related varieties. A marked reduction was observed in the yield of the F_2 as compared with that of the F_1 . It is concluded that the use of hybrid rye is commercially feasible provided that (a) the combining ability of the varieties to be employed is thoroughly tested beforehand; (b) care is taken to ensure that a high percentage of the seed designated as being hybrid is in fact the product of cross pollination between different inbred lines and does not result from self pollination; (c) qualities such as winter hardiness, resistance to lodging and adaptability do not suffer as the result of the initial inbreeding process; and (d) combinations are found in which the F_2 , as well as the F_1 , gives yields superior to those of the parent varieties.

367 RILEY, R.
The cytogenetics of the differences between some *Secale* species.

J. agric. Sci. 1955 : 46 : 377-83.

"The seed of crosses of *Secale cereale* with *S. montanum* and *S. dalmaticum* germinated only when *S. cereale* was the seed parent.

"*S. cereale* was found to differ from *S. montanum* and *S. dalmaticum* by two large translocations involving three pairs of chromosomes, and a small translocation involving a fourth pair. The fertility of the F_1 plants was low, and in ear morphology and perennial habit they were similar to the *S. montanum* and *S. dalmaticum* parents.

"*S. montanum* and *S. dalmaticum* were found to be similar in gross chromosome structure and their hybrids were phenotypically intermediate and fertile.

"The F_2 of the cross *S. cereale* x *S. dalmaticum* consisted of three types, in terms of chromosome structural condition and plant morphology, those like one or other parent and those like the F_1 .

"The genetic and evolutionary significance of this situation is discussed, together with the problem of the fixation of translocations in populations." [Author's summary].

368 Forsøg med tetraploid rug 1950-54.
(Trials of tetraploid rye, 1950-54).

Tidsskr. Planteavl 1955 : 59 : 171-73.

The results of further trials of two tetraploids

(cf. *PBA*, Vol. XXIII, Abst. 2623) are similar to those reported earlier.

369 PRUCKOV, F. M.
(Local rye varieties from Yakutia).
Zemledelie (Agriculture) 1955 : No. 7 : 115-16. [Russian].

Mention is made of the rye variety Sitnikovskaja, regarded as promising material for breeding hardy ryces. It surpasses in hardiness Omka, Tulunskaja Zelenozernaja [Tulun Green-grained], Vjatka and Lisicyn's rye, its tolerance of temperatures of about -50°C . being associated with a very long vernalization period. It is drought resistant, prostrate in habit and has a shallow branching root which makes the best use of frozen soil. The ears are short and the grain small to medium.

MAIZE

370 AVAKJAN, A. A.
(An experiment on cultivating maize in the Moscow province).
Agrobiologija (Agrobiology) 1955 : No. 2 : 33-41. [Russian].

Mention is made of a new forage variety, bred from an early southern form at Gorki Leninskie. It produces large amounts of forage and grain. Intervarietal open pollination improved the grain yield of a number of early strains.

371 AVAKJAN, A. A.
(A six years-old experiment on growing maize at Gorki Leninskie).
Dokl. Akad. seljskohozjaistv. Nauk Lenin. (Proc. Lenin Acad. agric. Sci.) 1955 : No. 2 : 8-11. [Russian].

Selection work with forage types, obtained by intervarietal open pollination involving a white dent from North Osetia as the ♀ parent is reported. The best families yielded up to 68 c. grain per ha.

372 NIJDAM, F. E.
Identification of maize hybrids.
Euphytica, Wageningen 1955 : 4 : 167-72.

Since cross-fertilizing varieties tend to be genetically variable they are not considered eligible for registration in the Netherlands (cf. *PBA*, Vol. XXIV, Abst. 2772). A system whereby the agricultural value of a cross-bred variety such as a maize hybrid can be guaranteed and the breeder's rights protected is described.

373 STEIN, O. L.

The rates of leaf initiation in two dwarfing genes, dwarf-1 and brachytic-2 in *Zea mays* L.

Diss. Abstr. 1955 : 15 : Publ. No. 11,123 : 325-26.

Leaf initiation in the embryo was of equal duration in inbred A21 and the mutants brachytic-2 and dwarf-1 but the mutants had lower final rates of initiation, resulting in embryos with fewer leaves, dwarf-1 having fewest. Between the seedling stage and time of tassel development, A21 and brachytic-2 grew for 27 days and produced about 14 leaves while dwarf-1 continued growth for 48 days and produced about 18 leaves. There were indications that the expression of the genes was subject to environmental influence.

374 AGBLE, W. K.

The inheritance of maturity as measured by time of silking; and other character associations in *Zea mays*.

Diss. Abstr. 1955 : 15 : Publ. No. 11,961 : p. 924. (Abst.).

In two crosses between early and late varieties, earliness of silking was associated with low moisture content at harvest. The former character was completely dominant and appeared to be governed by four factors which are stated to have duplicate and recessive suppressor interactions, while the latter character was partially dominant and apparently controlled by three factors. Transgressive segregation for earliness was observed.

375 LUKJANJUK, V. I.

(New varieties of maize).

Nauka i Žiznj (Science & Life), Moskva 1955 : 4 : 49-50. [Russian].

A brief description of VIR25 [Plant Industry 25], obtained at the Kubanj Research Station by crossing the single-cross hybrids Iskra [Spark] and Ideal, is given. It is distinguished by long ears, large yields of forage and grain, early maturity and resistance to smut. Mention is made of VIR42, another double-cross hybrid possessing similar properties.

376 GALEEV, G. S.

(Maize hybrids from VIR).

Zemledelie (Agriculture) 1955 : No. 5 : 22-30. [Russian].

Descriptions of a number of new single and double-cross hybrids bred at the Institute of Plant Industry [VIR] are given. Most of them are yellow dents, show resistance to smut and

lodging and outyield other varieties and hybrids by 3-13 c. per ha.

377 OZERNYĬ, M. E.

(My own experiment on producing high maize yields).

Zemledelie (Agriculture) 1955 : No. 6 : 17-21. [Russian].

Work on the improvement of Partizanka [Partisan], a productive large-eared variety from the Dnepropetrovsk province, is mentioned. One of its shortcomings is susceptibility to drought under Ukrainian conditions. Reference is made to trials of the F₁ of Partizanka x Dnepropetrovsk 5.

378 GLUŠČENKO, I. E.

(Hybrid maize in the nonchernozem belt).

Zemledelie (Agriculture) 1955 : No. 6 : 82-87. [Russian].

Descriptions are given of several hybrids notable for good forage and grain yields under Moscow conditions. They were obtained by intervarietal open pollination involving forms originating from the Ukraine, Kirgizia, Siberia, Estonia and Rumania. Recent introductions from Italy, Bulgaria and Hungary include forage types 3.5 m. tall.

379 BELIZIN, A. P.

(New promising varieties of maize for northern districts).

Agrobiologija (Agrobiology) 1955 : No. 3 : 45-54. [Russian].

A number of varieties obtained by crossing Minnesota 13 Extra with Odesskaja Gruševskaja [Odessa Gruševskaja] and Harjkovskaja Belaja Zubovidnaja [Harjkov White Dent] with the popcorn variety Risovaja [Rice] are described. Some produce large kernels and long ears and most show resistance to drought, lodging, smut and bacteria and ripen even in the Kursk province.

380 Le maïs hybride en Égypte. **(Hybrid maize in Egypt).**

Bull. Un. Agric. Égypte 1955 : 53 : 26-29.

The object of this article is to encourage Egyptian farmers to grow hybrid maize and to give them an insight into the methods by which hybrid varieties are developed. After a brief account of the introduction of American hybrids into Europe and the Mediterranean basin by FAO, the writer describes in general terms work at present being carried out under the egis of the Egyptian Ministry of Agriculture to breed hybrids better adapted to local condition than are the introduced North American hybrids. Notes on the value of male sterility in growing

seed on a commercial scale and on breeding for resistance to borers are also included.

- 381 LITZENBERGER, S. C. & PINEDA, C. R.
Cuba M-11, un maíz híbrido para Nicaragua. (**Cuba M-11, a hybrid maize for Nicaragua**).

Bol. Minist. Agric. Ganad., Nicaragua 1954 : No. 1 : unpaginated.

Cuba M-11 is a yellow dent double-cross hybrid produced at Las Vegas experimental station in Cuba (cf. *PBA*, Vol. XXIII, Abst. 1153); it is resistant to *Puccinia polysora* and *Helminthosporium turcicum* and has produced more grain per hectare than any other variety or hybrid so far tried in Nicaragua; it exceeds varieties such as Venezuela 3 not only in yield but in earliness and shortness of straw.

- 382 **Tennessee 29 corn released for commercial production.**

What's New Crops Soils 1955 : 7 : No. 8 : p. 31.

Tennessee 29, a new hybrid released in Tennessee, has a white cob with white kernels of good milling quality. It is strong-stalked and yields as well as or better than Dixie 33.

- 383 **New corn hybrids released for use in Indiana; outyield older varieties, stand better.**

What's New Crops Soils 1955 : 7 : No. 9 : p. 28.

Indiana 902A, a late white hybrid adapted to southern Indiana, has outyielded Indiana 909, contains about 1% less moisture at harvest and has better standing capacity. AES510 is as early as Iowa 4308 but yields more and also stands well. Both hybrids have been released by the Purdue University Agricultural Experiment Station, Lafayette, Ind.

- 384 **New silage-type corn announced for use in western Oregon.**

What's New Crops Soils 1955 : 7 : No. 9 : p. 27.

The new maize hybrid Oregon 150 has given an average of 20% higher yields of grain and silage than Oregon 525 but has the same maturity period. It is expected to replace the latter variety.

- 385 Sortsforsøg med majs til grønhøstning. (**Varietal trials of maize for silage**).

Tidsskr. Planteavl 1955 : 59 : 175-76.

Data are given on the dry weight, yield of green matter, height and date of flowering of four

hybrids tested on different soil types at four stations in Denmark over the period 1953-54. The Netherlands varieties CIV2 and Goudster [Golden Star] gave the highest yields, the former being earlier.

- 386 MCGILL, D. P. & LONNQUIST, J. H.
Effects of two cycles of recurrent selection for combining ability in an open-pollinated variety of corn.

Agron. J. 1955 : 47 : 319-23.

MCGILL, D. P.

Effect of two cycles of recurrent selection for combining ability on yield in an open-pollinated variety of corn.

Iowa St. Coll. J. Sci. 1955 : 29 : 456-67.

Investigations were carried out at the Nebraska Agricultural Experiment Station, Lincoln, on the open-pollinated dent maize Krug and on two high-yielding synthetics and one low-yielding synthetic developed from Krug by two cycles of recurrent selection. S_0 plants of Krug and of the three synthetics were outcrossed to WF9 x M14. Yield data from these crosses indicated that the two cycles of recurrent selection had been effective in modifying combining ability and that the two high-yielding synthetics could be expected to provide better sources of new lines than Krug. Self pollination was continued in the S_1 lines intercrossed for the first cycle, selection in each selfed generation for high or low combining ability being based on the yields of test crosses with WF9 x M14. The mean yields of test crosses involving the two high-yielding synthetics did not differ significantly from those involving 22 lines selected for high combining ability under the system of continuous self pollination. The low-yielding synthetic and 8 lines selected for low combining ability also gave approximately equal yields. Considering that selection during continuous self pollination had been more intensive than during recurrent selection, the latter method is regarded as the more efficient. The two synthetics were less variable in combining ability than Krug, the reduction in variability being greater than had been anticipated. Loss of variability is partly attributed to a shift in gene frequency resulting from effective selection and partly to inbreeding. The increase in inbreeding beyond that expected on the basis of the number of lines selected in each cycle may possibly be the result of nonrandom mating in the composites and differences in the yielding ability, prepotency and viability of the selected S_1 lines.

387 WHITELEY, J. R.

Cross-incompatibility in maize.

Iowa St. Coll. J. Sci. 1955 : 29 : 530-31.
(Abst.).

Cross-incompatible popcorn inbreds pollinated by compatible popcorn or dent corn inbreds gave highly variable seed sets, the variation showing some environmental influence. The F_2 populations from crosses between incompatible inbreds or from crosses between compatible lines showed no segregation for receptivity to dent pollen. Some F_2 progenies from compatible x incompatible crosses segregated for this character in the 1:1 ratio expected from previous evidence that cross incompatibility is determined by a series of alleles at the *ga* locus, growth of *ga* pollen tubes being inhibited in Ga^sGa^s silks and retarded in Ga^sga silks; other F_2 populations deviated widely from expectation. Deviation from the expected 1:1 ratio was also found in back-cross populations of the type (compatible x incompatible) \varnothing x incompatible σ , while the progenies of the reciprocal were generally receptive. Back crosses of the F_1 to the compatible parent generally produced receptive progenies. The performance of crosses and back crosses involving the popcorn inbred W5 and the dent inbred 4Co63 indicated that in this case growth of *ga* pollen tubes was completely inhibited by Ga^sga plants. No cytoplasmic influence on compatibility in any crosses was observed. It is suggested that compatible and incompatible inbreds possess modifying genes and/or alleles which differ from the Ga^s and *ga* type.

388 VAN SCHAİK, T.

Effect of plant vigor on stability of the variegated pericarp allele.

J. Hered. 1955 : 46 : 100-04.

In a comparison between F_1 maize hybrids and their nearly homozygous inbred components carrying the P^{vv} allele for variegated pericarp, there was no difference between the hybrids and inbreds in the mutation rate of P^{vv} that could be explained as the effect of partial or complete dominance of modifying genes for mutability. The mutation rate of hybrids lacking vigour through being grown under conditions of extreme crowding was 0.54 of that of normally grown hybrids.

389 BUTLER, D. R.

A system for the classification of corn inbred lines.

Diss. Abstr. 1955 : 15 : Publ. No. 12,011 : 949-50. (Abst.).

The taxonomic characters used as a basis for a

key to the identification of 66 inbreds grown at Columbus, Ohio, are described and discussed. They comprise ratios of measurements of plant parts and tassel, ear and kernel characters.

390 LAUGHNAN, J. R.

Structural and functional aspects of the A^b complexes in maize. I. Evidence for structural and functional variability among complexes of different geographic origin.

Proc. nat. Acad. Sci. USA 1955 : 41 : 78-84.

The A^b complex in maize originating from Ecuador consists of the components α , responsible for brown pericarp, and β , determining purple plant and aleurone (cf. *PBA*, Vol. XXV, Abst. 2633). The several A^b "alleles" examined in Peruvian types have also been found to consist of complexes whose members are separable by crossing over. These complexes differ however from the A^b complex in Ecuadorian maize in the sequence of the α and β components and in the lower phenotypic effect of the α member. The change in sequence of the two components is attributed to crossing over within serial duplications whose members have retained synaptic equivalence.

391 LIN, M.

Chromosomal control of nuclear composition in maize.

Chromosoma 1955 : 7 : 340-70.

This is the full account of the work on the composition of the microsporocyte nucleoli of maize with different chromosome constitutions referred to in *PBA*, Vol. XXV, Abst. 3030.

392 MORRIS, R.

Induced reciprocal translocations involving homologous chromosomes in maize.

Amer. J. Bot. 1955 : 42 : 546-50.

Eighteen interchanges involving opposite arms of homologous chromosomes were detected among 1636 plants raised from seeds treated with X rays or thermal neutrons. The resulting pseudoisochromosomes usually showed no association with each other or any of the other nine bivalents. At pachytene, pairing between the homologous arms of a pseudochromosome was in most cases regular. The pseudoisochromosomes tended to lag at metaphase and anaphase. Evidence was obtained from the behaviour of pseudoisochromosomes involving the nucleolar chromosome 6 that at least one member of a pseudoisochromosome pair was not included in a proportion of the gametes.

393 FERWERDA, F. P.

Monoploïden als uitgangspunt voor homozygote stammen bij mais. (**Monoploïds as a starting point for homozygous lines in maize**).

Erfelijkh. i. Prakt. 1955 : 16 : 5-6.

A brief general account of the production of homozygous maize diploids from haploids is given.

394 URANO, K., TANAKA, Y. & KIYOSAWA, S. (**Genecological studies on maize. II. On varietal differences in the content of growth hormone in the maize coleoptile**).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 23 : 110-15. [Japanese].

Studies on mesocotyl length and auxin production by the coleoptile tip in a series of Japanese and American maize varieties are reported. Mesocotyl length is correlated with auxin production ($r = +0.84$); American varieties usually have longer mesocotyls and produce more auxin than Japanese forms.

395 MUSIŦKO, A. S.

(**The new maize variety Odessa 10**). Zemledelie (Agriculture) 1955 : No. 7 : 77-81. [Russian].

Odessa 10, obtained by open pollinating Liming Kubanskii [Kuban] Leaming] with Dnepropetrovsk and Minnesota 13 Extra, yields up to 100 c. grain and 600 c. forage per ha. in the steppe, while in other Ukrainian districts its forage yield may well exceed 900 c. per ha. The plants are 2.8-3 m. tall and the ears weigh 430 g. and ripen 15-18 days before Liming Kubanskii. The 1000 grain weight is over 375 g.

396 JOSEPHSON, L. M.

The use of cytoplasmic male sterility in the production of hybrid maize seed.

Emp. J. exp. Agric. 1955 : 23 : No. 89 : 1-10.

The behaviour of Tx61Mms and Ky27ms, with cytoplasmic male sterility derived from Golden June and 33-16 respectively, was studied in numerous crosses and back crosses at the Kentucky Agricultural Experiment Station and at Potchefstroom, Union of South Africa. Several inbreds were found that were capable of restoring fertility in crosses with one or the other of the two male-sterile sources. The possibility of using cytoplasmic male sterility for commercial production of hybrids in South Africa is discussed.

397 BRIGGLE, L. W.

A comparison of cytoplasmic-genotypic interactions in a group of cytoplasmic male sterile corn types. Iowa St. Coll. J. Sci. 1955 : 29 : 385-86. (Abst.).

Five different forms of cytoplasmic male sterility were distinguished among eight types of maize from different sources. The single cross M1984 x M14 was the only one of the eight in which the expression of male sterility was influenced by the date of planting. The incomplete male sterility of M1984 x M14 is regarded as being controlled by a cytoplasmic factor in conjunction with a single gene exerting a pleiotropic effect which causes a reduction, as compared with the fully fertile reciprocal cross, in the growth and development of the anthers and of the pollen grains bearing the dominant allele. Deviations from the expected ratios in the F_2 and back-cross populations are attributed to the action of modifying genes. From preliminary studies it appears that Vg and Reid, two of the eight sources under investigation, bear the genes SS or Ss together with a cytoplasmic factor, while an inbred line which restores fertility in the F_1 carries a dominant allele designated S^1 .

398 FARQUHARSON, L. I.

Apomixis, polyembryony and related problems in *Tripsacum*.

Diss. Abstr. 1954 : 14 : Publ. No. 8786 : p. 1134.

The frequency of facultative apomixis of the pseudogamous type approached 100% in some races of tetraploid *Tripsacum* (species not indicated). Polyembryony occurred with a frequency of approximately 50% in certain 4n races. Chromosome numbers in 128 plants of unspecified origin proved to be $2n = 36, 45, 54, 72, 90$ and 108. Twins often differed in chromosome number. The following crosses were successful: *Tripsacum* x maize, teosinte x *Tripsacum*, *T. dactyloides* x *T. floridanum* and crosses involving 2n and 4n races of *T. dactyloides*. Other aspects investigated included the taxonomic significance of racial differences in branching habit, rhizome development and other characters.

399 DAVIS, J. H., KRAMER, H. H. & WHISTLER, R. L.

Expression of the gene *du* in the endosperm of maize.

Agron. J. 1955 : 47 : 232-35.

Evidence is presented indicating that, although *du*, which controls the development of opaque endosperm, appears to be completely recessive, it requires the presence of a specific modifier,

designated Du_m , in order to produce the opaque phenotype. The genes du , Du_m and su^{am} , the last of which interacts with du to increase the amylase content of the endosperm starch, are each unable, when acting alone, to produce a phenotype readily distinguishable from normal dent, but one or more doses of Du_m in the triploid endosperm, and in some cases one dose of su^{am} , permit the expression of three doses of du . The gene Du_m has no effect on the phenotypic expression of su^{am} and appears to have little or no influence either alone or in combination with du or su^{am} on the amylose/amylopectin ratio in the starch.

400 MEHROTRA, H. N.

Inheritance of foliage leaf number in maize.

Diss. Abstr. 1955 : 15 : Publ. No. 10,516 : 315-17.

Considerable variation in leaf number occurred in each of the seven inbred lines studied, but early-maturing lines tended to produce a smaller total number of leaves than later-maturing lines. In both inbreds and hybrids, the total leaf number was negatively correlated with the number of leaves produced above the ear but showed a high positive correlation ($r = +0.97$) with the number below the ear. The values for F_1 progenies fell between the parental values and no differences between reciprocal crosses were observed.

401 PICKLUM, W. E.

Histological and cytological changes in the maize embryo during germination.

Iowa St. Coll. J. Sci. 1955 : 29 : 479-80. (Abst.).

The development of the embryo in several inbreds and hybrids is described and some differences are noted. The possibility of measuring histological differences and using the data in determining the inheritance of certain characters is discussed.

402 BRANDOLINI, A.

Contributo allo studio delle varietà italiane di mais. Il granturco "Rostrato" (*Zea mays* L. cv. "Rostrata"). III. Potenzialità del "Rostrato" quale fonte di germoplasma. [A contribution to the study of Italian varieties of maize. The maize Rostrato (*Z. mays* L. cv. Rostrata). III. Potentialities of Rostrato as a source of germ-plasm].

Ann. Sper. agr. 1955 : 9 : No. 4 : Suppl. : ciii-cxviii.

In discussing the probable origin of the Rostrato

[Beaked] maize (cf. *PBA*, Vol. XXV, Absts. 2979-80) it is suggested that it probably arose by hybridization between a popcorn of the south American pisingallo type, resembling say the Peruvian Arica, with a European semiflint or starchy type. Descriptions of Rostrato maize grown in the province of Bergamo in 1916 are cited, together with evidence suggesting that the varieties with which it crossed were the Nostrano and Scagliolo maizes of that province. Owing to its hybrid origin the Rostrato of today is very heterogeneous and tables are given showing the variation in characteristics of a number of lines selected from it in 1952. In crosses with American inbreds some of these selections have given rise to triple hybrids distinguished by very strong root systems and unusual resistance to lodging, combined with resistance to noctuids and to fungous infection. Hybrids between Rostrato selections and inbreds from Nostrano dell'Isola show marked heterosis in respect of thickness of culm, height of plant, height of insertion of the ear, diameter of ear and leaf length; the number of days from germination to flowering was less in the hybrids than in the parent lines; the number of ears per plant and the ear and grain characters of the Rostrato type were dominant.

403 GOSI, L.

Il mais della varietà colturale "Precoce di Bagnolo". (Maize of the cultivated variety Precoce di Bagnolo).

Genet. agr. 1955 : 5 : 1-43.

Information is presented concerning the origin of the Tuscan maize Precoce di Bagnolo [Bagnolo Early], the conditions under which it is grown and its botanical and agronomic characteristics. It is resistant to a number of diseases and pests, apart from corn borer and smut, it stands well and on account of its earliness escapes the worst effects of drought; it is short in stature, most plants being only 11 cm. tall or less, with short internodes. The variety is at present genetically heterogeneous and could serve as a source of inbred lines for producing hybrids suitable for the rather arid conditions of central Italy.

404 Drouth tolerant hybrid.

Sth. Seedsman 1955 : 18 : No. 7 : 28, 61.

Developed at the Texas Research Foundation Station at Renner, Tex., the early white maize hybrid TRF3 is high-yielding, tolerant of drought, responsive to fertilizers and adapted to soil and weather conditions throughout the maize-growing area of Texas.

- 405 RYLAND, A. K. & STOREY, H. H.

Physiological races of *Puccinia polysora* Underw.

Nature, Lond. 1955 : 176 : 655-56.

Previous investigations have revealed that the hypersensitive type of resistance of maize seedlings to the above rust in East Africa is controlled by a dominant major gene (cf. *PBA*, Vol. XXIV, Abst. 2943). Many lines homozygous for this gene have been selected from resistant Central American types and from crosses between these types and susceptible East African varieties at Muguga, Kenya. Prior to January 1955 no evidence had been obtained from greenhouse tests that more than one physiological race was present in East Africa but more recently the reactions of some lines have indicated the presence of a new race. Since the known natural occurrence of *P. polysora* is more than 100 miles from Muguga and no newly collected material has been introduced into the glasshouses for over two years, it is unlikely that the new race has been accidentally introduced from outside sources.

- 406 HOOKER, A. L., SPRAGUE, G. F. & RUSSELL, W. A.

Resistance to rust (*Puccinia sorghi*) in corn.

Agron. J. 1955 : 47 : p. 388.

A brief interim account of work in progress at the University of Wisconsin and the Iowa State College on the genetics of resistance to *P. sorghi* in maize is presented. So far 45 strains possessing protoplasmic resistance at the seedling stage to one or more biotypes of the pathogen have been collected. Genes conditioning resistance are in the process of identification.

- 407 RUBIS, D. D.

Inheritance of resistance in corn to the European corn borer and to diplodia stalk rot.

Iowa St. Coll. J. Sci. 1955 : 29 : 489-90. (Abst.).

The results of experiments on resistance to the first brood of the European corn borer suggest that the effectiveness of individual plant selection for resistance would be low and that alternate back-crossing and selfing would be more effective than back-crossing alone in transferring resistance to a susceptible inbred. Similar results were obtained for stalk-rot resistance. Resistance appears in both cases to involve additive gene action, with some dominance and epistasis. It is suggested that recurrent selection would be the most effective method of increasing the frequency of genes for resistance.

BARLEY

- 408 Wintergerst, 1955. (Winter barley, 1955).

Landbouwwoorlichting 12 : Bijl. 10; Ber. Rassenkeuze 1955 : No. 189 : unpaginated.

Data on the relative yields, on different types of soil, of the principal varieties cultivated in the Netherlands are tabulated and a brief description of the main characters of each variety is given. Urania, hitherto the most widely cultivated winter barley in the Netherlands, is giving way to new varieties such as Vinesco, Trias and Atlas (cf. *PBA*, Vol. XIX, Abst. 979).

- 409 SIERRA F., J. A. & RICO MEJÍA, E.
-
- Mejoramiento de las cebadas en Colombia. (Improvement of barleys in Colombia).

Agricultura trop. 1955 : 11 : 399-403.

It is concluded that the barleys originally introduced from Spain into Colombia were of the Coast type, tolerant of adverse conditions, and that the present-day varieties Raspa and Pocha have originated from crosses of them with later introductions, of which the only ones to remain more or less pure were Chilena Inglesa [English Chile] and Hanna. The first of the varieties to be produced from the breeding programme started in 1951 is Funza, characterized by much higher yielding capacity than the older varieties.

- 410 TAKAHASHI, R., YAMAMOTO, J., YASUDA, S. & ITANO, Y.

Inheritance and linkage studies in barley.

Ber. Ohara Inst. 1953 : 10 : 29-52.

The genes *al* (liguleless) and *Pr* (Purple leaf-sheath), both found in a Japanese mutant, occur in the linkage group *al-pr-v* (six-rowed)-*e* (long-awned outer glume) in chromosome I. The gene for bracteate ear (*trd*), found in another Japanese mutant, is linked with *B* (black chaff), with about 15% recombination. *Ll* (lax v. dense ear), *Lhklk* (normal v. short awn) and *Nn* (covered v. naked grain) are linked in the order cited in chromosome III. *K* (normal hood), *K^e* (elevated hood) and *h* (long awn) constitute an allelomorphic series linked with *Bl* (blue aleurone) in linkage group IV. Subjacent hood (*sk*) is recessive to the long-awned condition determined by *Sk*; the gene pair *sksk* is epistatic to *K* and *K^e*. The Japanese subjacent hooded barley Sekitorihei is differentiated from the Chinese subjacent hooded variety Tayeh 13 by the presence of *uz* (semibrachytic habit). Fragile stem, characterizing the Japanese variety Kamairazu, is determined by the gene *fs*, which

occurs in the linkage group *fs-s* (short-haired rachilla)-*r* (smooth awn) in chromosome V.

411 OINUMA, T.

(Caryomorphology of cereals VIII. On the relationship between caryo-type and linkage group in barley).

Senshokutai (Chromosome)/Kromosomo 1953 : Nos. 17-19 : 651-56. [Japanese].

The mode of segregation of the *a* chromosomes and of row number in the ear was studied in crosses involving the varieties *Hordeum agriocrithon* (*a*₁) Wasegorudemmeron [Early Golden Melon] (*a*₂) and Shosochosansa (*a*₃). The two characteristics were inherited together, demonstrating that linkage group I, which includes *Vv* determining row number, is carried by the *a* chromosomes.

412 SAKAI, K.-I. & GOTOH, K.

Studies on competition in plants. IV. Competitive ability of F₁ hybrids in barley.

J. Hered. 1955 : 46 : 139-43.

The competitive abilities of five inbreds and their ten F₁ hybrids were determined by comparing their performance in respect of heading date, dry weight, length and number of culms and weight of heads per plant in pure stands with their performance in mixed stands with two tester varieties. While most of the hybrids displayed heterosis with regard to dry weight, number of culms and weight of heads, their competitive abilities were in general below the parental mean.

413 HAMILTON, D. G., SYMKO, S. & MORRISON, J. W.

An anomalous cross between *Hordeum leporinum* and *Hordeum vulgare*.

Canad. J. agric. Sci. 1955 : 35 : 287-93.

Among three F₁ clones produced at the Central Experimental Farm, Ottawa, as a result of pollinating *H. leporinum* (*2n* = 28) with *H. vulgare* (*2n* = 14), two main plant types were found: (1) those with *2n* = 28 which were glabrous but otherwise resembled the female parent in most characters; and (2) those with *2n* = 14 which resembled the male parent in many characters but had a brittle rachis, winter growth habit and seed dormancy. Dwarfs and other abnormal plants also occurred among the F₁ progeny. Plants of type (1) were cross sterile with *H. vulgare*. The progeny of type (2) plants varied in growth rate, spike shape and awn roughness, were resistant to *Erysiphe graminis*, could be crossed with *H. vulgare* and showed normal chromosome pairing. The new material

may be of value as a source of winter hardiness and disease resistance but a satisfactory explanation of the mechanism of inheritance involved in this cross has yet to be given.

414 SIMONET, M. & CHOPINET, R.

Contribution à l'étude descriptive d'un hybride méditerranéen de graminées: *x Hordeopyrum rouxi* (*Hordeum secalinum* *x Agropyrum repens* var. *littorale*). [Contribution to the descriptive study of a Mediterranean hybrid in the Gramineae: *x H. rouxi* (*H. secalinum* *x A. repens* var. *littorale*)].

Congr. Socs. sav. 1954 : No. 79 : 211-16.

Morphological evidence is put forward in support of the hypothesis that *A. rouxi* (*2n* = 49), first found in 1858 in the salt marshes of Berre on the Mediterranean coast of France, is a natural hybrid between *H. secalinum* (*2n* = 28) and *A. repens* var. *littorale* (*2n* = 42). The hybrid, which is sterile, is thought to have derived a double set of chromosomes from *H. secalinum*, the ♀ parent, and a single set from the ♂ parent. Two specimens of *A. rouxi*, discovered recently by the authors in the Montpellier district bore a close resemblance to *H. secalinum* but the ears were similar to those of *H. repens* var. *littorale*. Length of stalk and leaves were intermediate between those of *H. secalinum* and *H. repens* var. *littorale*.

415 NILAN, R. A. & MOH, C. C.

A mutant line of barley induced by atomic-bomb radiation.

J. Hered. 1955 : 46 : 49-52.

A partially ovule-sterile mutant of Trebi induced by atomic bomb irradiation at Bikini in 1946 appears to be of the genotype *+ c/s +, s* governing ovule sterility and *c* being a recessive factor for chlorophyll deficiency. The two factors are linked, with a crossing-over percentage of 7.4. The data indicate that the high frequency of cream-coloured seedlings (39%) produced on selfing can be ascribed to the anomalous female gametic ratios arising from the partial ovule sterility. No plants homozygous for ovule sterility were obtained.

416 RAMAGE, R. T. (JUN.).

The trisomics of barley.

Diss. Abstr. 1955 : 15 : Publ. No. 11,994 : p. 946. (Abst.).

Descriptions are given of the distinguishing morphological features of each of the trisomics *a* to *g* derived from plants with the respective chromosomal interchanges, *a-b*, *c-d*, *e-f* and *b-g*. Plants trisomic for *g* were highly sterile and those trisomic for *c* or *d* completely self

sterile. Trisomics derived directly from plants with interchanges were less vigorous and fertile than those obtained from outcrosses of such plants. A higher proportion of the small than of the large seeds from trisomic plants were trisomic. A method is envisaged of setting up tertiary trisomic stocks by means of which individual genes on either of the chromosomes involved in the interchange may be located.

417 SYBENGA, J.

Variation in *Hordeum vulgare* L. and *Trifolium repens* L. after colchicine treatment.

Diss. Abstr. 1955 : 15 : Publ. No. 12,294 : 1159-60. (Abst.).

The possibility of obtaining homozygous material by using colchicine to induce haploidy through somatic reduction, followed by doubling to give the diploid number, was investigated in barley hybrids and a number of white clover plants. Tetraploid sectors and a number of variant types were found among the 2000 treated barley plants, but no evidence of homozygosis was obtained. Neither tetraploidy nor the expression of recessive characters was observed among the 150 treated clover plants.

418 SCHULTE, H.-K.

Untersuchungen zur Genetik und zur physiologischen Funktion der Granne bei der Gerste. (Investigations on the genetics and physiological function of the awn in barley).

Z. Pflanzenz. 1955 : 34 : 157-96.

The mode of inheritance of awnlessness in barley was investigated by means of crosses of awned varieties with Arlington awnless, Wong and the botanical forms *Hordeum vulgare* vars. *dundar-beyi*, *inermis*, *greseynudiinermis* and *subdecussatum*. In crosses in which one of the first five of these awnless forms was involved, awnlessness was inherited as an intermediate character, the F_1 having awns half the length of those of the awned parent while the F_2 segregated in the proportions 1 awned : 2 semiawned : 1 awnless. In the cross *H. vulgare* var. *rehmii* x *H. vulgare* var. *subdecussatum*, awnlessness proved fully dominant in the F_1 , the F_2 segregating in the ratio 3 awnless : 1 awned. Experiments on the physiological role of the awn indicated that it played an important part in photosynthesis, transpiration and the development of the grain, removal of the awn at time of flowering resulting in a decrease in the size and number of mature grains. In view of these findings it is suggested that breeding for awnlessness in barley should be abandoned in favour of the development of

awned varieties that shed their awn just before the grain matures.

419 EVERSON, E. H. & SCHALLER, C. W.

The genetics of yield differences associated with awn barbing in the barley hybrid (Lion x Atlas¹⁰) x Atlas.

Agron. J. 1955 : 47 : 276-80.

The association between semismooth awns (*rr*) and high yield in the above hybrid (cf. *PBA*, Vol. XXIII, Abst. 1193) appears to be conditioned by one factor or a block of linked factors lying between the *Rr* and *Ss* loci of chromosome V. The increase of 14-32% over the yield of Atlas occurred only in early plantings, late plantings showing no noticeable increase.

420 BENDELOW, V. M. & MEREDITH, W. O. S.
Reliability of prediction tests for malting quality of barley.

Canad. J. agric. Sci. 1955 : 35 : 252-58.

A rapid method for estimating malting quality is described and the results of prediction tests of 243 hybrid lines are compared with those of actual malting tests. Of the lines shown to have good malting quality, 79% were selected by the prediction test. The remaining 21% gave low saccharifying values; most of these lines included Peatland in their parentage, a variety which is known to cause underestimation of saccharifying activity.

421 HIURA, U. & HETA, H.

Studies on the disease-resistance in barley. II. Physiologic races of *Erysiphe graminis hordei* in Japan.

Ber. Ohara Inst. 1953 : 10 : 17-28.

Two new biotypes, 8B and 8C, and three new races, 13, 14 and 15, were found to comprise the mildew samples collected in surveys in Japan during 1950-52. The differential hosts used were those recommended by Tidd (cf. *PBA*, Vol. VII, Abst. 1259) with the addition of Colseas CA772, Duplex CI2433 and Kairyobozu.

422 ZEIDAN, M. I.

The inheritance of resistance to *Ustilago nuda* (Jens.) K. and S., race 1, in barley.

Diss. Abstr. 1955 : 15 : Publ. No. 11,154 : p. 326.

Jet, Anoidium, Harlan and Ogallitsu, all of which are resistant to the above pathogen, were crossed in various combinations. In Jet x Harlan, Harlan x Ogallitsu and Ogallitsu x Anoidium, resistance is regarded as the result of the interaction of two independently inherited gene pairs in dominant epistasis; in Harlan x Anoidium, resistance appears to be determined by two interacting genes in dominant and

recessive epistasis. The following characters were found to be monogenically determined in Jet x Harlan: two-rowed *vs.* six-rowed ear; covered *vs.* naked seeds; and black *vs.* white lemma and pericarp.

- 423 POEHLMAN, J. M. & CLONINGER, C. K.
Resistance to three barley smut diseases in Missouri Early Beardless strains.

Agron. J. 1955 : 47 : 243-53.

Details are given of the reactions of a number of strains and hybrids of Missouri Early Beardless to 13 physiological races of *Ustilago nuda* (cf. *PBA*, Vol. XXV, Abst. 3060), to nine races of *U. nigra* and to 13 of *U. hordei*. The tests were conducted at the Missouri Experiment Station.

- 424 MILLER, J. D. & LAMBERT, J. W.
Variability and inheritance of reaction of barley to race 15B of stem rust.

Agron. J. 1955 : 47 : 373-77.

Seedling and adult plant reaction of 250 barley varieties, mainly from the World Collection, were determined at temperatures of 70° F. and 82° F. A scale, based on relative size of the pustules, was devised for seedling reaction. Chlorosis was present at both temperatures, but necrosis was more abundant at the lower temperature. Testing at 82° F. was found to be a better criterion for assessing seedling resistance than testing at 70° F. A close, but not absolute, correlation was established between seedling and adult plant resistance; this correlation was greatest when the seedlings were tested under greenhouse conditions at 82° F. and the results compared with the reaction of adult plants of the same variety in the field. Crosses between the resistant variety Minnesota 615 on the one hand and Kindred (resistant) and Montcalm (susceptible) on the other were studied in the F₁-F₃ generations. Resistance appeared to be determined by a single dominant gene. Some indication was obtained of the presence of minor genes exercising a modifying influence under certain environmental conditions, for example low temperatures.

- 425 HORBER, E.
Unterschiede in der Anfälligkeit verschiedener Wintergerstensorten gegenüber der Sommergeneration der Fritfliege. (Differences in the susceptibility of various winter barley varieties to the summer generation of the frit fly).

Mitt. schweiz. Landw. 1955 : 3 : 113-18.

Observations made at the Federal Agricultural Research Station, Zürich-Oerlikon, Switzerland,

over the period 1952-1955 indicated that considerable differences exist between varieties in susceptibility to attack by frit fly. Carstens Zweizeilige [Carsten's two-rowed], Bordia, Rinika, Firbeck I and Engelen suffered least.

- 426 TIMIAN, R. G. & SISLER, W. W.
Prevalence, sources of resistance, and inheritance of resistance to barley stripe mosaic (false stripe).

Plant Dis. Repr. 1955 : 39 : 550-52.

Of a number of barleys tested for resistance to stripe mosaic at the Agricultural Experiment Station, Fargo, N. Dak., Modjo (CI3212), CI3112-1, CI4219 and CI5020 showed some resistance to the strain designated California "E". Crosses between these and susceptible varieties resulted in F₂ segregation ratios which agreed satisfactorily with a ratio of 3:1 for plants with symptoms to plants without.

- 427 SUNESON, C. A.
Breeding for resistance to yellow dwarf virus in barley.

Agron. J. 1955 : 47 : p. 283.

The resistance of Rojo appears to be determined by a single recessive gene which is now being transferred to California Mariout and other susceptible varieties in California.

MILLETS AND SORGHUMS

- 428 PITNER, J. B., LAZO DE LA VEGA, J. L. & DURÓN, N. S.
El cultivo del sorgo. (Sorghum cultivation).

Foll. téc. Secretaría Agric. Ganad., México 1955 : No. 15 : Pp. 50.

Sorghum is better suited than maize to areas with uncertain rainfall and its cultivation in Mexico is extending. An account is given of the botany of the plant, its cultivation and uses. Over 200 varieties are now under trial in Mexico, the most promising of which for the time being seem to be Honey, Sourless, High Hegari, Sumac, Leoti, Rancher and Atlas for forage and Scarborough, Fulltip, Black Spanish, Acme, Dwarf Broomcorn (Texas selection) and Evergreen for brooms. Tables are given showing the yields of a number of varieties of grain sorghums in different localities in the period 1950-53 and on the basis of these data recommendations are made as to the most suitable varieties for each of the main zones of the country. These are followed by descriptions of the most outstanding, which are Dwarf Milo, Early Hegari, Hegari, Double-dwarf Hegari, High Hegari, Kafir 1, Kafir 2C, Redbine 1, 2 and 3, Caprock and Shallumex 1.

429 New southern forage crop.

Agric. Res., Wash. 1955 : 4 : No. 2 : 10-11.

Perennial hardy types producing high-quality grazing and silage have been developed by crossing sorghum as female with Johnson grass, as the result of cooperative work by the US Department of Agriculture and the Mississippi Agricultural Experiment Station.

430 HARRIS, H. B.

A new instrument for emasculating sorghum.

Agron. J. 1955 : 47 : 236-37.

An instrument suitable for emasculating small numbers of sorghum flowers is described. Its use in hybridization has resulted in good seed sets at the Georgia Experiment Station.

431 KAUKIS, K. & REITZ, L. P.

Ontogeny of the sorghum inflorescence as revealed by seedling mutants.

Amer. J. Bot. 1955 : 42 : 660-63.

Air-dried dormant caryopses of *Sorghum vulgare* were X-irradiated or exposed to thermal neutrons. From the distribution of mutant X_2 seeds within the X_1 inflorescences, it was concluded that the tissues comprising an entire panicle usually derive from more than one cell in the dormant embryo.

432 CICCARONE, A. & MALAGUTI, G.

Notas sobre la biología y control del carbón del sorgo (*Sphacelotheca sorghi* (Lk.) Clinton) en Venezuela. [Notes on the biology and control of sorghum smut (*S. sorghi* (Lk.) Clinton) in Venezuela].

Bol. téc. Minist. Agric. Cría, Venezuela 1952 : No. 6 : Pp. 42.

In a study of sorghum smut, the most serious disease of this crop in Venezuela, observations on the reaction of a number of varieties were included. Local varieties proved more susceptible than those recently introduced. This may be accounted for by a selective effect the local varieties have had on the population of biotypes.

433 GOVINDA RAO, P.

A short note on the varietal resistance in sorghum to short smut and some leaf spots.

Andhra agric. J. 1955 : 2 : 86-90.

In a field test of Coimbatore strains at the Agricultural College Farm, Bapatla, Andhra, Co.1 showed least susceptibility to *Sphacelotheca sorghi*, with 1.4% of infected heads as against 4.6% in the local type. Co.9 was least infected by *Helminthosporium turcicum* and Co.1 by *Ramulispora sorghi*. Co.2 and Co.6 remained

free from infection by *Colletotrichum gramini-colum*.

RICE

434 TINARELLI, A.

Classificazione delle razze di riso coltivate in Italia. (Classification of the rice varieties grown in Italy).

Riso, Milano 1955 : 4 : No. 8 : 12-18.

Tables and diagrams are presented in which the main Italian rice varieties are placed in order of length of husked grain and data are given of length of unhusked grain, width of grain, 1000 grain weight, proportion of husk to kernel and proportion of length to breadth in husked and unhusked grain. Some quite new varieties not yet released are also included.

435 MINGHELLI, A.

Contributo alla produzione di sementi elette. (Contribution towards the production of elite seeds).

Riso, Milano 1953 : 4 : No. 7 : p. 21.

Figures are given showing the quantities of selected seed sold in Italy in 1955 for different rice varieties; Americano 1600 heads the list. Marked improvements have been brought about by selection in the varieties Stirpe 136 [Strain 136], Maratelli, Vialone, Allorio and Ardizzone.

436 Report of the West African Rice Research Station, Rokupr, Sierra Leone 1953 (1955) : Pp. 12.

Selection and hybridization of rice continued. In crossing, the flowers are forced open by placing in saturated air at 43° C. in a vacuum flask.

437 JOHNSTON, T. H. & CRALLEY, E. M.

Rice varieties and their yields in Arkansas, 1948-1954.

Rep. Ser. Ark. agric. Exp. Sta. 1955 : No. 49 : Pp. 19.

The results of trials of short, medium and long grained varieties at several localities in Arkansas are summarized.

438 SAHADEVA, P. C.

A method of artificial hybridization of rice.

Madras agric. J. 1950 : 37 : 459-60.

The method described consists of planting the varieties that it is desired to cross side by side, with the ♀ parent surrounded by two or more plants of the variety intended as the ♂ parent. Shortly before anthesis the ♀ parent is emasculated, male and female plants are tied together in the form of a bouquet, and the whole assemblage gently shaken to ensure the discharge of the pollen on to the stigmas.

- 439 ABRAHAM, T. P., BUTANY, W. T. & GHOSH, R. L. M.
Discriminant function for varietal selection in rice.

Indian J. Genet. 1954 : 14 : 51-53.

From a study of data on yield trials carried out at the Central Rice Research Institute, Cuttack, it is concluded that the use of discriminant functions based on yield components does not give a better indication of the genotypic value of a strain than yield itself and therefore does not increase selection efficiency.

- 440 BABA, I.
(Differences in the resistance to root rot of rice varieties and a simple method for ascertaining it).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1955 : 23 : 167-68. [Japanese].

Data on varietal resistance to the toxic action of H₂S in the soil are presented. Resistance to H₂S is positively correlated with resistance to autumn drop. A laboratory method for estimating the effect of H₂S on the root is outlined.

- 441 CHANDRARATNA, M. F.
Genetics of photoperiod sensitivity in rice.

J. Genet. 1955 : 53 : 215-23.

Data obtained from crosses of the photo-periodically insensitive line Vellai Ilankalayan with four sensitive lines under long-day conditions during the south-west monsoon at the Peradeniya Station, Ceylon, indicated that sensitivity depends upon a single dominant gene (*Se*). In the short-day season of the northeast monsoon, the prevalence of near-optimum day lengths prevented the expression of *Se*, the F₁ of all crosses showing increased earliness of heading as the result of heterosis. The author has obtained information, not yet published, that minimum period between germination and heading is polygenically determined; elucidation of the genetics of this character and photo-periodic sensitivity may explain some of the discrepancies in the results obtained by previous investigators of the inheritance of earliness. *Se* belongs to linkage group I, being linked with *ap* for apiculus colour with a recombination value of $17.3 \pm 2.23\%$ and with one of three complementary *Au* genes for colour of the auricle and junctura; this *Au* gene and *Ap* are linked with a recombination percentage of 2.4 ± 2.0 . *Se* has a pleiotropic effect upon tillering capacity, *Se* phenotypes having a higher number of tillers than the recessives.

- 442 KURITA, H. & YAMAMURA, I.
(Studies on the distribution of rice culture. II. On the relation between the choice of rice varieties, on the one hand, and day length and temperature, on the other).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 23 : 103-04. [Japanese].

Data are presented on the photoperiodic and temperature requirements for heading and on the number of days between transplanting and heading for a series of widely-grown Japanese varieties.

- 443 ENOMOTO, N., YAMADA, I. & HOZUMI, K.
(Artificial germination of rice pollen. II. Pollen-tube elongation and an instance of varietal differentiation).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1955 : 23 : p. 162. [Japanese].

The growth of the pollen on starch paste containing 15% sucrose was studied for a series of Japanese and introduced varieties. The pollen of the introduced varieties grew for a longer period and the tubes so formed were of a greater length than in the Japanese varieties.

- 444 JODON, N. E.
Quality in rice as it concerns the breeder.

Rice J. 1955 : 58 : No. 8 : 24-27.

Problems in breeding for milling and cooking quality are discussed with reference to requirements of the industry and consumer in the USA. Some information on procedures used for testing varieties for cooking quality is included.

- 445 VASCONCELLOS, J. DE C. E.
Sete novas variedades botânicas de *Oryza sativa* L. (Seven new botanical varieties of *O. sativa* L.).

Comiss. Regul. Comérc. Arroz, Lisboa 1952 : Pp. 3.

Five new botanical varieties in subsp. *sativa*, one in subsp. *japonica* and one in subsp. *brevis* are described.

- 446 MARIE, R. & DENOY, I.
La rizière expérimentale du Merle en 1954. (The experimental rice plantation at Le Merle in 1954).

Progr. agric. vitic. 1955 : 72 : 121-36.

The following research at the Le Merle experimental rice fields (cf. *PBA*, Vol. XXII, Abst. 1945) is reported: comparative yield trials of varieties considered suitable for cultivation under French conditions; observations on tillering, fertility and number of days to maturity

of a number of recently introduced varieties, many of Japanese origin; and hybridization to obtain earlier maturing strains giving increased yields and possessing a greater degree of resistance to lodging and shattering.

447 BABA, I. & INADA, K.

(On the redox potential of the tissue fluid of rice. IV. Varietal differences in the redox potential of the leaf).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1955 : 23 : 189-91. [Japanese].

Eh values of leaf homeogenates of a series of Japanese varieties were determined. Eh values were positively correlated with resistance to autumn drop and sesame leaf spot.

448 VENKATANADHACHARY, G. & NARASINGA RAO, M. B. V.

Results of preliminary studies of rice varieties at the Deep Water Station, Pulla.

Andhra agric. J. 1955 : 2 : 60-65.

The results of tests of varieties at the above station in the Collair tract, Andhra, suggest that Burma Akkulu may be grown more successfully than the strains Akkulu and GEB-24 which are used at present in areas affected by flooding in the first-crop season. Burma Akkulu has stiffer straw than local strains and is undergoing selection. Some Siamese types possess stiff, tall stalks but produce coarse rice of poor quality; they have been crossed with better quality local strains such as GEB-24 and MTU-1.

FORAGE GRASSES

449 KORNILOV, A. A.

(Is continuous selection needed when breeding perennial forage plants?)

Zemledelie (Agriculture) 1955 : No. 5 : 90-94. [Russian].

The notion of some Soviet breeders that hybrid populations of grasses and leguminous forage plants cannot be improved by continuous selection is rejected and instances of the efficacy of this method, notably in the production of improved varieties of *Agropyron*, lucerne and sainfoin, are given.

450 RASMUSSEN, F.

Forsøg med stammer af almindelig rajgræs, timothe, hundegræs og eng-svingel 1946-1952. (Trials of strains of perennial ryegrass, timothy, cocksfoot and meadow fescue, 1946-1952).

Tidsskr. Planteavl 1955 : 59 : 36-61.

Eleven strains of ryegrass, six of timothy, ten of

cocksfoot and seven of meadow fescue were tested on different soil types at eight stations in Denmark. Data are given on the dry weight, yield of green matter and, for the last three species, yield of crude protein.

451 SPECKMANN, G. J.

A rapid laboratory method for cytological control in polyploidy breeding.

Euphytica, Wageningen 1955 : 4 : 163-66.

A simple method for cytological checking in grasses and clovers is described. Seeds are germinated on filter paper under optimum conditions and when the roots are about 5 mm. long the tips are removed and fixed and their chromosome numbers determined. The seedlings are meanwhile allowed to regenerate in readiness for potting should they prove to be tetraploids.

452 SULLIVAN, J. T. & ROUTLEY, D. G.

The relation of the protein content of forage grasses to earliness of flowering.

Agron. J. 1955 : 47 : 206-07.

At the US Regional Pasture Research Laboratory, University Park, Pa., the protein contents of 29 cocksfoot plants with emerging heads showed a highly significant negative correlation with the dates at which emergence occurred ($r = -0.86$). The correlation between the protein contents of 37 plants in full bloom and the dates of reaching full bloom was also negative and highly significant ($r = -0.68$). No significant correlations between these characters were observed in *Phalaris arundinacea* or timothy.

453 WASSOM, C. E.

Topcross and polycross progeny tests for evaluating general combining ability of S_0 and S_1 clones of orchard-grass, *Dactylis glomerata* L.

Iowa St. Coll. J. Sci. 1955 : 29 : 528-29. (Abst.).

Replicate top-cross tests were found to be more reliable than polycross tests for detecting inter-clonal differences in combining ability and were more easily carried out.

454 KALTON, R. R., LEFFEL, R. C., WASSOM, C. E. & WEISS, M. G.

Evaluation of combining ability in *Dactylis glomerata* L. I. Clonal and outcross progeny performance.

Iowa St. Coll. J. Sci. 1955 : 29 : 631-57.

Investigations were carried out on noninbred clones and their single-cross, top-cross and poly-

cross progenies. The parental clones exhibited differences in combining ability for forage yield, disease resistance, date of flowering, panicle number and vigour of spring growth. Clonal performance was of least value in predicting combining ability, although correlations between parents and single crosses for date of flowering, spring vigour, panicle number and disease scores were significant. Low parent-progeny associations for forage yield appeared to be primarily due to low heritability. Single-cross, top-cross and polycross tests were of similar value for determining combining ability, although the degree of correlation between the performance of the three types of progeny was considerably influenced by method of planting and number of replications. In the parental clones, correlations involving leafiness, forage yield, panicle number and spring vigour were positive and significant; date of flowering was negatively associated with the three last-mentioned characters; plant height, incidence of leaf disease and seed yield showed little or no relationship with other characters. Correlations in the progeny tests were lower but significant positive associations of spring vigour with panicle number and forage yield were detected. The top-cross test is considered to be more satisfactory than the polycross for evaluating combining ability in cocksfoot; details of a proposed breeding method which includes the top-cross test are given.

- 455 KALTON, R. R. & LEFFEL, R. C.
Evaluation of combining ability in *Dactylis glomerata* L. III. General and specific effects.
Agron. J. 1955 : 47 : 370-73.

Crosses in all possible directions were made between 11 noninbred, highly heterozygous clones and the F_1 generations evaluated for vigour, resistance to leaf diseases, date of flowering, forage yield and panicle production over a 2-year period. Apart from disease resistance, no significant expression of specific combining ability could be ascertained, variances attributable to general combining ability being greater than those for specific combining ability in all comparisons. Individual clones varied in general combining ability from one year to the other. The application of these results to studies of combining ability in cross-pollinated crops and to the development of synthetic varieties is discussed. It is considered that, in the case of crosses between such highly heterozygous lines as the *D. glomerata* clones studied, decidedly superior or inferior combinations would be unlikely to occur in F_1 progenies.

- 456 MICHALSKI, T.
Studia cytologiczno-morfologiczne nad *Phleum commutatum* z Tatr. (Cytological and morphological studies on *Ph. commutatum* from the Tatras).
Acta Soc. Bot. Polon. 1955 : 24 : 181-88.

Herbarium specimens of *Ph. commutatum* are found most often under the name *Ph. alpinum*. The above study was made to discover whether *Ph. commutatum* found in the Tatras is of the same chromosomal type as the specimens from northern regions and the Alps and whether, in fact, the true *Ph. alpinum* occurs in the Tatras. The material consisted of living plants from 13 stations in the Western Tatras and 7 in the High Tatras.

Morphological investigation led the author to conclude that his specimens represent *Ph. commutatum*, and he found no plants in his collection which corresponded morphologically to *Ph. alpinum*. Cytological study proved that all his plants had the chromosome number $2n = 14$ and so were diploids. This association of the diploid number of chromosomes with the morphological type of the species *Ph. commutatum* is of interest, since according to earlier work on herbarium specimens from the Tatras by Nordenskiöld, the species *Ph. commutatum* is tetraploid ($2n = 28$). *Ph. commutatum* thus appears to be a species in which caryological differentiation is connected with geographical distribution, since earlier work has shown biotypes from northern regions and from the Alps to be tetraploid.

- 457 ELDER, W. C.
Greenfield Bermuda-grass.
Bull. Okla. agric. Exp. Sta. 1955 : No. B-455 : Pp. 7.

Further information is given on the characteristics and performance of the variety Greenfield (cf. *PBA*, Vol. XXIV, Abst. 3035).

- 458 LOWE, C. C. & MURPHY, R. P.
Open-pollinated seed setting among self-sterile clones of smooth brome-grass.
Agron. J. 1955 : 47 : 221-24.

Clonal differences in numbers of spikelets per head, florets per head, florets per spikelet, seeds per head and seeds per spikelet and in percentage of fertile florets were determined for 30 self-sterile clones of *Bromus inermis* grown in a polycross nursery at Ithaca, NY. The last three characters were each highly and positively correlated with the number of viable seeds per plant, the correlation coefficients being 0.87, 0.90

and 0.94 respectively. Percentage of fertile florets is considered to be the most useful character for assessing seed-producing ability.

- 459 CARNAHAN, H. L. & HILL, H. D.
***Lolium perenne* L. x tetraploid *Festuca elatior* L. triploid hybrids and colchicine treatments for inducing autoallohexaploids.**

Agron. J. 1955 : 47 : 258-62.

Twelve sterile but vigorous hybrids with 21 chromosomes were obtained by pollinating *L. perenne* ($2n = 14$) with the induced tetraploid *F. elatior* ($4x = 28$). Univalents and trivalents were observed at metaphase I, the hybrids differing significantly in frequency of univalents. Occasional bridges were present at anaphases I and II and numerous micronuclei occurred in the tetrads. Pollen fertility was 0-3.2%. Treatment of F_1 tillers with aqueous colchicine resulted in the production of autoallohexaploids which may be of use in transferring characters from diploid *Lolium* and *Festuca* to hexaploid *F. arundinacea*. Highly significant differences were observed in the amount of chromosome doubling occurring in the F_1 clones.

- 460 BURTON, G. W.
Breeding Pensacola Bahiagrass, *Paspalum notatum*: I. Method of reproduction.

Agron. J. 1955 : 47 : 311-14.

Most clones proved to be highly self sterile in investigations in Florida, an average seed set of 6.0% being obtained by selfing. The majority of clones were cross compatible, evidence being obtained that compatibility reactions were determined by a multiple allelic system of the oppositional type, involving many *S* factors. The extreme variability of spaced clones from natural populations with respect to plant type, seed production, rate of spread, leaf length, leafiness, forage production, disease resistance, shattering and anther colour indicated that Pensacola is highly cross-pollinated. On the average the S_1 generation showed 25% and 34% reduction in forage and seed yield respectively but no decrease in leafiness, compared with open-pollinated progenies.

- 461 DENMAN, C. E.
Lahoma sweet sudan grass.
Bull. Okla. agric. Exp. Sta. 1955 :
No. B. 452 : Pp. 7.

The variety Lahoma is described in detail (cf. *PBA*, Vol. XXIV, Abst. 3046).

- 462 ROMBERG, P. F.
The taxonomy of the genus *Andropogon* (L.) in Nebraska.

Diss. Abstr. 1955 : 15 : Publ. No. 11228 : p. 495.

Three species, *A. scoparius*, *A. gerardi* and *A. hallii*, were recognized. No evidence was obtained that hybridization affects the first; the remaining two, however, hybridize freely, introgression being so intense that the original parental types are rare. It is suggested that *A. chrysocomus* and *A. paucipulus* are merely hybrid segregates.

- 463 MEHRA, K. L.
Chromosome races in *Heteropogon contortus*.

Indian J. Genet. 1954 : 14 : 82-86.

Two of the seven strains from India and W. Pakistan investigated at the Indian Agricultural Research Institute, New Delhi, were hexaploid ($n = 30$) while the rest were tetraploid ($n = 20$). Multivalents, univalents and bivalents were observed at diakinesis and metaphase I in all the tetraploids and in the one hexaploid in which meiosis was studied. Further meiotic irregularities included unequal disjunction, lagging chromosomes and dividing univalents.

- 464 ZANINI, E. & BALLATORE, G. P.
Sulle possibilità di coltura primaverile-estiva asciutta di nuove stirpi di sorgo gentile da foraggio (*Sorghum sudanense* Stapf) nei territori caldo-aridi della Italia meridionale e insulare. [The possibilities of cultivating new races of sweet forage sorghum (*S. sudanense* Stapf.) in spring in hot, dry areas of southern Italy and the islands].

Ann. Sper. agr. 1955 : 9 : 785-810.

An account is given of experiments carried out at Palermo, Sicily, during 1949-53, in which it is shown that certain new varieties of sweet Sudan grass are capable of producing green fodder throughout the summer in arid places almost without rainfall, where yields of 200-240 q. of green matter per ha. have been obtained. The best variety was Saturno, from the Bologna plant breeding institute, and next in order of merit were Sweet Sudan and Honey Drip.

- 465 TATEOKA, T.
(The chromosomes of *Digitaria adscendens*).

Senshokutai (Chromosome)/Kromosomo 1953 : Nos. 17-19 : 689-90. [Japanese].

The cariotype of *D. adscendens* is $2n = 54 =$

$10A_1^m + 2A_2^{sm} + 2A_3^{st} + 4B_1^m + 6B_2^{sm} + 6B_3^{st} + 10C_1^m + 6C_2^{sm} + 6D_1^m + 2D_2^{st}$; the caryotype of *D. chinensis* is reported as $2n = 18 = 2A^m + 2A^{sm} + 2B_1^m + 4B_2^{sm} + 2B_3^{sm} + 2C_1^m + 2^tC_2 [sic] + 2C_3^m$. These results support the view that the basic chromosome number of the genus is $x = 9$.

466 Ross, J. G.

Stoloniferous crested wheatgrass.

Agron. J. 1955 : 47 : 327-28.

Stoloniferous plants were observed during 1954 in a population derived from selections of Standard in the breeding nursery at the South Dakota State College. If the stoloniferous character can be fixed within a variety, it would be valuable as a means of propagating outstanding genotypes.

LEGUMINOUS FORAGE PLANTS

467 **New creeping alfalfa developed in Canada: seed available in 1956.**

What's New Crops Soils 1955 : 7 : No. 8 : p. 34.

Developed at the Swift Current Experimental Station, Saskatchewan, from hybrid populations of Ladak and Siberian, Rambler is a creeping-rooted variety superior to Grimm and Ladak in drought resistance and winter hardiness and, except in eastern Canada, equal or better in yield. Its wilt resistance is slightly better than that of Ladak. It recovers slowly from cutting but has good resistance to shattering.

468 MEDLER, J. T., MASSENGALE, M. A. & BARROW, M.

Flowering habit of alfalfa clones during the first and second growth.

Agron. J. 1955 : 47 : 216-17.

Plants of nine clones studied at Madison, Wis., flowered at about the tenth node under short days and the fifteenth under long days, interclonal differences being less than those caused by changes in day length.

469 MORIYA, N., IKEDA, Z. & HOSHINO, M.
(On the influence of tripping on fertilization in lucerne).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1955 : 23 : 200-01. [Japanese].

Data are provided on fruit set without tripping, after self-tripping, after self-tripping with the standard petal removed, after artificial tripping and after insect tripping. The impact of the stigma against the standard petal, which

scatters the pollen mass and exposes the underlying conductive tissue of the style, appears to play an important role in the fertilization process.

470 LEVIN, M. D. & PEDERSEN, M. W.

A technique for collecting pure alfalfa pollen.

Agron. J. 1955 : 47 : 387-88.

The method described consists of placing bumble bee colonies in plots of lucerne covered by a wire cage. The pollen-carrying bees are anesthetized and the pollen removed.

471 STANFORD, E. H.

Resistant plants. Alfalfa variety resistant to aphid attack and adapted to desert areas planned.

Calif. Agric. 1955 : 9 : No. 7 : p. 5.

As the starting-point of an attempt to breed an aphid-resistant lucerne for the desert valleys of California, the resistant variety Lahontan is to be crossed with a variety, such as Africa, capable of growth at the low temperatures during winter.

472 RASMUSSEN, F.

Forsøg med stammer af tidlig og halvslidig rødkløver, 1945-1950. (Trials of early and semilate red clover strains, 1945-1950).

Tidsskr. Planteavl 1955 : 59 : 17-35.

Details are given of the yield, dry weight, vigour and earliness of nine early and ten semilate strains tested on different soils at ten stations in Denmark.

473 LIELMANIS, JA.

(Clovers of the Latvian SSR).

Zemledelie (Agriculture) 1955 : No. 5 : 52-55. [Russian].

At the Stenden Breeding Station the yield of the early red clover variety 51 i was improved by intervarietal open pollination and exceeded that of Stendskii Pozdnespelyi 11 [Stenden Late 11], which had previously been outstanding in yield among Latvian varieties.

474 KOLOMIEC, P. T.

(Dormancy period of red clover).

Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 4 : 50-57. [Russian].

Under Moscow conditions, a wild population from Toboljsk and Moskovskii 1, which was selected from a central Russian population, had longer dormancy periods than red clovers introduced from Batumi and Suhumi. Selection for a long period of dormancy and vigorous development during the growth period are among the criteria recommended for breeding hardy red clovers.

- 475 CARNAHAN, H. L., HILL, H. D., HANSON, A. A. & BROWN, K. G.
Inheritance and frequencies of leaf markings in white clover.
 J. Hered. 1955 : 46 : 109-14.

Evidence is adduced that V-shaped leaf markings in *Trifolium repens* are determined by a series of simply inherited alleles: V^h (high full V), V^l (low full V), V^b (broken V), V^{by} (broken V with yellow tip), V^p (V-point), V^{w1} (V white inside) and v (no V); V^{w1} appears to be the same as the gene designated V^{f1} by Brewbaker and Anderson (cf. *PBA*, Vol. XXIII, Abst. 1273). The V locus appears to be linked with that governing incompatibility, with a crossing-over value of about 42%. Red pigmentation also seems to be conditioned by a series of multiple alleles; these are designated R^1 (red leaf), R^m (red midrib), R^f (red flecks) and r (no red pigment).

- 476 BREWBAKER, J. L.
V-leaf markings of white clover.
 J. Hered. 1955 : 46 : 115-23.

The work reported in *PBA*, Vol. XXIII, Abst. 1273, is described in detail and the V alleles are now designated as follows: V (full V), V^H (full high V), V^B (broken V), V^{Bh} (broken V, high), V^P (V-point), V^F (filled V), V^L (low V) and v (no V); in addition, a broken V with a yellow tip (cf. Abst. 475) and a "spread V" each appear to be determined by a partially dominant allele at the V locus.

- 477 BRADSHAW, A. D. & PRITCHARD, T.
Wild white clover in natural mountain grassland.
 Nature, Lond. 1955 : 176 : p. 596.

An ecological race from Cwm Llefrith in north Wales has been identified in preliminary transplant experiments. It is characterized by small plant size, extreme persistence and adaptability to upland conditions of grazing and climate.

- 478 OYAMA, T.
(Cytological studies on teratological leaf growth associated with an X-ray-induced translocation in white clover and on reversion to the original form in the F_1).

Senshokutai (Chromosome)/Kromosomo 1953 : Nos. 17-19 : 665-70. [Japanese].

In continuation of the results summarized in *PBA*, Vol. XXIV, Abst. 398, the author shows that the aberrant-leaved plants of X-irradiated material of strain EW^R carry a translocation between chromosomes M_2 and R_3 . Meiosis in these plants is described.

- 479 DADAY, H.
Cyanogenesis in strains of white clover (*Trifolium repens* L.).
 J. Brit. Grassl. Soc. 1955 : 10 : 266-74.

Twelve strains of British or foreign origin showed marked differences in the frequencies of plants belonging to the four phenotypes with (1) lotaustralin and linamarase, (2) lotaustralin only, (3) linamarase only and (4) neither lotaustralin nor linamarase respectively. Such differences are regarded as a useful subsidiary aid in strain identification.

- 480 HANSON, C. H. & COPE, W. A.
Reproduction in the cleistogamous flowers of ten perennial species of *Lespedeza*.

Amer. J. Bot. 1955 : 42 : 624-27.

The cleistogamous flowers of *L. cuneata*, *L. latissima*, *L. inschanica*, *L. hedyaroides*, *L. floribunda*, *L. virgata*, *L. daurica*, *L. virginica*, *L. stuevei* and *L. repens* are described. From data on F_2 segregation in interspecific crosses, it is concluded that reproduction in the cleistogamous flowers is the result of self fertilization and not of apomixis.

- 481 GORZ, H. J.
Inheritance of reaction to *Ascochyta caulicola* in sweetclover (*Melilotus alba*).

Agron. J. 1955 : 47 : 379-83.

The genetics of resistance to stem canker was investigated in a series of crosses between susceptible and resistant plants. Reaction to the disease was found to depend upon two pairs of interacting genes, Ee and Gg . The dominant gene for susceptibility, G , was effective only in the absence of E , the gene conferring resistance. Plants of the constitution $eegg$ were also resistant although not to the same extent as plants with E . Susceptibility could be eliminated in breeding lines by crossing to homozygous susceptible tester plants containing a recessive marker for the elimination of selfs. The absence of susceptibility in the F_1 would reveal the presence of the EE genotype, which could maintain resistance in the progenies of plants in a cross or self-pollinated nursery.

- 482 LAMBERTS, H.
Broadening the bases for the breeding of yellow sweet lupine.

Euphytica, Wageningen 1955 : 4 : 97-106.

In this survey of lupin breeding, desirable characters such as freedom from alkaloids, resistance to *Erysiphe polygoni*, *Fusarium oxysporum* var. *lupini* and mosaic, rapid early growth, nonshattering, glabrous pods, soft-

coated seeds and high seed production are discussed and a number of varieties available in the Netherlands bearing one or more of these characters are noted. The advisability of combining the good qualities of different lines and of using wild forms as a source of useful genes is stressed (cf. *PBA*, Vol. XXV, Abst. 3154).

483 LARSEN, K.

**Cyto-taxonomical studies in *Lotus*.
II. Somatic chromosomes and
chromosome numbers.**

Bot. Tidsskr. 1955 : 52 : 8-17.

In the second paper of this series (cf. *PBA*, Vol. XXV, Abst. 3157) the chromosome numbers of the following 13 species from Europe and North Africa are reported: *L. angustissimus*, $2n = 12$; *L. commutatus*, $2n = 28$; *L. corniculatus*, $2n = 24$; *L. drepanocarpus*, *L. edulis*, *L. hirsutus* and *L. jacobaeus*, $2n = 14$; *L. japonicus*, $2n = 12$; *L. ornithopodioides*, $2n = 14$; *L. peliorrhynchus*, $2n = 28$; *L. strictus* var. *albus*, $2n = 14$; *L. uliginosus*, $2n = 12$; *L. weilleri*, $2n = 14$. In addition, the numbers of the following species are noted: *L. creticus*, $2n = 28$; *L. cytisoides*, $2n = 14$; *L. filicaulis*, $2n = 12$; *L. hispidus*, $2n = 24$; *L. requienii* and *L. siliquosus*, $2n = 14$; *L. tenuis*, $2n = 12$; *L. tetragonolobus*, $2n = 14$.

484 PAWAR, M. S. & KULKARNI, S. A.

**Chromosome numbers in *Sesbania*
species.**

Curr. Sci. 1955 : 24 : 207-08.

The following chromosome counts have been made: *S. sesban*, *S. speciosa* and *S. macrocarpa*, $2n = 12$ and *S. sericea*, $2n = 24$.

ROOTS AND TUBERS

485 Statens forsøg med stammer af foderroer.
(National trials of strains of fodder
roots).

Tidsskr. Planteavl 1955 : 59 : 169-70.

This report has been summarized in *PBA*, Vol. XXV, Abst. 2115.

486 KRASOČKIN, V. T.

**(Characteristics of the biological
cycle of development in beet forms
and hybrids).**

Trud. priklad. Bot. Genet. Selekc. (Bull.
appl. Bot. Gen. Pl.-Breed.) 1951 : 29 :
No. 1 : 22-39. [Russian].

Observations were made on a collection of beets comprising forms from over 50 different countries, grown in a range of different latitudes

throughout the Soviet Union. Northern forms gave little or no bolting when grown in Leningrad and the amount of bolting increased progressively in forms from further south; this was connected with the length of their vernalization and light stages. The varieties tested were divided into four main groups, starting with the oriental and Adriatic forms, which in the Soviet Union behave as annuals, and ending with a group which includes the north Scandinavian mangels of the Barres type, which give less than 20% bolting after vernalization for 80 days.

A number of crosses were made between members of different groups. The results, which are tabulated, show that where an annual form was crossed with a biennial with short stages, the annual habit was dominant in the F_1 ; when the biennial form had long stages, as in the case of Barres Northern 1376, the dominance of the annual habit was less pronounced; the degree of dominance varied also with the length of the phases in the annual parent and according to the place where the hybrids were grown; it was greatest at Leningrad in the north and less in more southerly localities, particularly when these were at high altitudes, where the date of sowing was somewhat later.

A certain amount of segregation for time of flowering was observed in the F_1 ; the F_2 from F_1 combinations showing almost complete dominance of annual habit in Leningrad varied from 81 to 100% of bolting according to the parental combination used; in more southerly localities dominance was reversed and biennial segregates were in the majority.

487 JÄHNEL, G.

**Ergebnisse der Rübenversuche des Jahres
1954. (Results of beet tests during
the year 1954).**

VersErgebn. Bundesanst. alp. Landw.
Admont 1955 : No. 28 : Pp. 56. (Mimeo-
graphed).

Of the mangels tested, Ovana and Zentaur [Centaur] gave the best all-round performance and appear well adapted to cultivation under Alpine conditions. Eckendorfer had the highest root yield and Favorit [Favourite] the highest contents of sugar and dry matter. Ovana, Zentaur and Corona contained the highest percentage of crude protein.

Among the sugar beets, Beta 242/53 and Hilleshög gave the highest yields of roots, dry matter and sugar. Hoffmanns weisse Riesen [Hoffmann's White Giant] responded best with increased yields of root, dry matter and sugar to artificial irrigation.

- 488 MANTARI CAMARGO, C.
El mejoramiento del cultivo de las ocas (*Oxalis tuberosa* Mol.). (**The improvement of the cultivation of *Oxalis tuberosa* Mol.**).
Inform. Div. Exp. agríc., Perú 1955 : No. 47 : Pp. 16.

Information is included on the yield, vegetative cycle and morphology of the principal varieties grown in the provinces of Puno and Junín.

- 489 JÄHNEL, G.
Ergebnisse der Kartoffelversuche des Jahres 1954. (**Results of potato trials during the year 1954**).
VersErgebn. Bundesanst. alp. Landw. Admont 1955 : No. 27 : Pp. 48. (Mimeographed).

The results of trials conducted to determine the comparative suitability of a wide range of varieties for cultivation in the Austrian Alps are presented. The information given, which is presented in tabular form, includes data on average yield, starch content and tuber size and on varietal differences in susceptibility to virus diseases, late blight, scab and *Rhizoctonia* sp. Oberarnbacher Frühe [Oberarnbach Early] gave the highest yields among the early varieties, followed by Vera. Ackersegen was the most productive of the late varieties but, in cooking quality, was inferior to the medium-yielding variety Agnes.

- 490 MONOT, G.
Note sur les essais de plants de pommes de terre hors métropole. (**Note on potato trials outside metropolitan France**).
Pomme d. Terre franç. 1955 : 18 : No. 191 : 12-17.

The results of yield trials conducted in recent years in French overseas territories and elsewhere abroad are summarized with a view to giving the French grower an insight into developments outside his own country.

- 491 MATVEEV, V. P.
(**Breeding potato varieties that give double yields**).
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 90-101. [Russian].

Observations on the dormancy of the tubers of the main varieties of domestic potato showed that some of them were capable of giving up to 50% germination after sowing the fresh tubers immediately after lifting in three successive generations. Some of the primitive species in which the tubers are entirely free from dormancy

are described; among these, *Solanum kesselbrenneri*, *S. boyacense* and *S. caniarensense* have given some of the most promising hybrids. The merits and defects of some of the domestic varieties for use in crossing with the primitive species and the best conditions for effecting pollination are examined; it has not been found possible to grow two generations a year even of the hybrids without dormancy, except where the first generation could be sown in January in heated greenhouses. The first dual-yielding varieties to be obtained were from crosses of *S. boyacense* with Epicure and with Brita; they have given yields exceeding that of standard varieties such as Lohr by up to 68% in the spring sowings and by up to 93% in the succeeding crop from summer sowing; they are equal to the domestic varieties in tuber shape and starch content but have deep eyes and are somewhat inferior in flavour. Notwithstanding these defects one of them, Hibiny 3 (Epicure x *S. boyacense*), was recommended in 1947 for cultivation in Uzbekistan.

Descriptions are given of four of the most promising hybrids.

- 492 BIENZ, D. R.
Pollination and incompatibility studies in *Solanum tuberosum* L.
Diss. Abstr. 1955 : 15 : Publ. No. 11,894 : p. 945. (Abst.).

In pollination studies involving crosses in all combinations between seven clones, it was found that the percentage fruit set and the numbers of seeds per fruit were greater in flowers pollinated just after opening than in those pollinated in the bud stage. Low fruit set in incompatible crosses and in flowers pollinated before opening could be attributed to the smaller numbers of pollen grains adhering to the stigma and to their lower percentage germination. Abnormal pollen tubes were found in the styles of both compatible and incompatible crosses. It is thought that incompatibility factors of the oppositional type are involved.

- 493 SIZOVA, M. A.
(**Anatomical structure of the flower and seeds of various species of potato**).
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 102-12. [Russian].

Details are given of the floral structure of *Solanum tuberosum* and *S. andigenum* ($2n = 48$), *S. curtilobum* ($2n = 60$), *S. kesselbrenneri* and *S. rybinii* ($2n = 24$), *S. demissum* ($2n = 70$) and *S. schreiteri* ($2n = 48$).

- 494 HEINZE, P. H., KIRKPATRICK, M. E. & DOCHTERMAN, E. F.

Cooking quality and compositional factors of potatoes of different varieties from several commercial locations.

Tech. Bull. US Dep. Agric. 1955 : No. 1106 : Pp. 69.

Quality for boiling, mashing and baking was investigated over a three-year period in relation to the composition of the raw tubers, using varietal lots from different localities and applying different storage conditions. Varieties studied in all three years comprised Chippewa, Green Mountain, Irish Cobbler, Katahdin, Russet Burbank and Triumph. Locality in some cases had as much influence upon some chemical constituents of the raw samples and on palatability as variety. High values for specific gravity, dry matter, alcohol-insoluble solids and starch were correlated with high ratings for dryness and mealiness, low rating for absence of sloughing upon boiling and, less closely, with high ratings for flavour and colour.

- 495 KORFÁCZY, I.

Burgonyagumók arginintartalmának meghatározása. (**Determination of the arginine content of potato tubers**).

Agrokémia és Talajtan 1955 : 4 : 81-86.

A modified Sakaguchi reaction for estimating the free and combined arginine in extracts from potato tubers is described, and figures are given for six varieties grown in Hungary.

- 496 DE LA HERA Y SÁENZ, P.

Buscando nuevas variedades de patata. (**In search of new varieties of potato**).

Agricultura, Madr. 1955 : No. 277 : 265-66.

The many defects of the potatoes at present grown in Spain are enumerated, one of the most serious being unsatisfactory quality. A large number of crosses have been made, using the old Spanish varieties as parents. One of these is a semiwild potato which may be a descendant of the first introductions from S. America; it is exceedingly drought resistant and a very good keeper and some of the hybrids and back crosses with it show distinct improvements in form and quality.

- 497 KAMERAZ, A. J.

(**New cultivated species in potato breeding**).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 77-89. [Russian].

Information is given for a number of primitive

species in respect of chromosome number, habit of growth, type of tuber cluster, size and form of tuber, photoperiodic reaction, length of dormancy, yield of tubers in long and short days, composition and flavour of tubers, fertility and reaction to *Phytophthora infestans*, wart, degeneration and frost.

Crosses of the primitive species among themselves, e.g. *Solanum ajanhuiri* x *S. phureja*, *S. rybinii* x *S. ajanhuiri*, *S. kesselbrenneri* x *S. phureja*, *S. phureja* x *S. rybinii* and *S. rybinii* x *S. phureja*, have given disappointing results; the same applies to triple hybrids such as (*S. rybinii* x *S. phureja*) x *S. rybinii*, or *S. rybinii* x (*S. rybinii* x *S. stenotomum*); all the hybrids of these types proved highly susceptible to blight and degeneration; among the healthiest were some of the hybrids of *S. rybinii* x *S. phureja*. The frost-resistant species *S. ajanhuiri*, characterized by high protein content, has been crossed with domestic potatoes but so far no promising hybrids have been obtained. Fairly good yields have been observed in some of the hybrids of *S. rybinii* with domestic varieties; thus Epicure x *S. rybinii* hybrids have yielded over 1000 g. of tubers per plant in Leningrad, the tubers being of fairly good shape and having a starch content of 18-19.5%. Some hybrids exceeding the standard varieties in yield have been produced from crosses of *S. boyacense* with domestic varieties and some of them have quite good starch contents; although their tubers are small and irregular in shape, these hybrids are of interest in being free from dormancy and so giving two yields a season in suitable areas; similar hybrids have been produced also from *S. kesselbrenneri* and *S. canariense*. From *S. curtilobum* some hybrids have been obtained which yield up to 2100 g. of tubers per plant, the tubers being of good shape, with starch contents from 15 to over 20%; others have yielded 5 kg. of tubers per plant; several of them have resisted prolonged frosts of -4° and even -5.5° C. but the most frost-resistant of the hybrids have tended to be late in maturity and low in yield.

- 498 WRIEDT, G.

Ein Beitrag zur Aufstellung eines über Samen vermehrbaren Testsortimentes für *Phytophthora infestans* (Mont.) de Bary. [**A contribution to the setting up of a test collection, capable of propagation by seed, for *Ph. infestans* (Mont.) de Bary**].

Z. Pflanzenz. 1955 : 34 : 125-56.

Factors contributing to the development and germination of spores of *Ph. infestans* are

discussed in detail. In 2-year old laboratory cultures, mutations of race A to B and C, of race H to F and of race B₁ to B₂ were observed. The suitability of a wide range of wild potato species, mainly of Mexican origin, for use in tests to differentiate between the various races of *Ph. infestans* was investigated, the aim being to obtain a collection of species and provenances each susceptible to one or more physiological races of the pathogen but resistant to others. The species were classified as resistant, semi-resistant or susceptible according to their reactions to each of seven races. Most of the provenances of *Solanum demissum* tested proved resistant to races A, B₂ and H but *S. demissum* 161165 was susceptible to race B₂ and *S. demissum* 161164 and *S. demissum* Riofrio segregated into resistant and susceptible forms. A single plant of *S. demissum* 161164 was also susceptible to race A. One provenance of *S. verrucosum* proved resistant to strains A, B₂ and H, another was susceptible to all these three strains. *S. stoloniferum* and a form designated *S. stoloniferum* (tlaxcalense) were susceptible only to race H. One line of *S. stoloniferum* (malinchense) proved susceptible to all races whereas other lines segregated for resistance to the various races. *S. polyadenium* was resistant to race H. One provenance of *S. suaveolens* proved resistant to race H, another segregated in the ratio 1 resistant : 1 susceptible. *S. demissum* Lindley 029, *S. stoloniferum* CPC 28-4 and a form designated *S. stoloniferum* (antip. Voldagsen 49) were resistant to races F and I; the other forms of *S. stoloniferum* tested were susceptible to these two races. Of 14 species and varieties of *Lycopersicon* spp. tested in an attempt to discover a form resistant to race A but susceptible to all other races, all were found to be susceptible to race A.

- 499 HOWATT, J. L. & GRAINGER, P. N.
Some new findings concerning
Phytophthora infestans (Mont.) De By.

Amer. Potato J. 1955 : 32 : 180-88.

Improvements in the technique and apparatus used to test for late-blight resistance in the potato in Canada are described (cf. *PBA*, Vol. XXV, Abst. 374). Evidence has been obtained suggesting that certain alternative differential hosts included in the proposed international system of designating the interrelationships of genes and races (cf. *PBA*, Vol. XXIV, Abst. 9627) may not be genotypically equivalent. The erratic behaviour of monosporous cultures is attributed to genotypical disparities in the

differentials rather than to heterogeneity in the isolates. No commercial varieties or seedlings have so far exhibited resistance to race 1, 2, 3, 4 which recently appeared at Fredericton, NB. A number of *Solanum demissum* collections and various interspecific hybrids have segregated for resistance to this race. It is noted that *S. demissum* 'S74' from Mexico, previously suspected of possessing a fifth gene for late-blight resistance, is heterozygous for resistance to race 1, 2, 3, 4.

- 500 GALLEGLY, M. E.
Physiologic races of *Phytophthora infestans*: their use in breeding for resistance.

Phytopathology 1955 : 45 : p. 464. (Abst.).

The genotypes of selections from potato crosses involving the resistance genes *R*₁, *R*₂, *R*₃ and *R*₄ may be determined by separate inoculations with races 1,2,3, 1,2,4, and 1,3,4 of *Ph. infestans*; a mixture of these races will destroy all individuals except those bearing all four genes. *Solanum demissum* has been shown to carry at least two additional dominant genes for resistance, by means of which a new race, 1,3,4+, has been identified. Isolates from tomato were either tomato race 0 or tomato race 1. Tomatoes bearing *TR*₁ were resistant to all isolates of 0 but susceptible to all of 1, while plants with only multiple genes for resistance were resistant to those isolates of 0 and 1 which were low in virulence. Tomato selections carrying both *TR*₁ and multiple-gene resistance have been obtained.

- 501 MASTENBROEK, C.
Over de differentiatie van *Phytophthora infestans* (Mont.) De Bary en de vererving van de resistentie van *Solanum demissum* Lindl. [On the differentiation of *Ph. infestans* (Mont.) De Bary and the inheritance of the resistance of *S. demissum* Lindl.].

Amsterdam 1952 : Pp. 121.

After an introductory chapter on the economic aspect of combating *Ph. infestans*, the author goes on to give the results of his own experiments, both in the laboratory and in the field, and to compare them with similar work by Black (cf. *PBA*, Vol. XXII, Abst. 2039), Peterson (cf. *PBA*, Vol. XXII, Abst. 2038), Reddick (cf. *PBA*, Vol. IV, Abst. 186) and others. Nine physiological races occurring in the Netherlands were distinguished and designated N1-N9. Race N1 was identified with Black's race A, N2 with B1, N7 with B2, N6 with C and N4 with D. Various series of wild species

and provenance types obtained from the Netherlands, from Scotland and from the USA were employed as differential hosts. Varieties and species susceptible to N1 proved also susceptible to all other races. Susceptibility to N2 may be associated with resistance to N1 but is combined with susceptibility to N7 which has, however, a wider spectrum (range of hosts to which it is pathogenic) than N2. N3 is nearly identical with N1. Susceptibility to N4 may be combined with resistance to N1 but is always associated with susceptibility to race N7. Resistance to N7 is associated with resistance to N2 and N4, the spectra of N2 and N4 being covered by that of N7. Susceptibility to N5 is often associated with resistance to N1, N2, N4 and N7. The spectrum of N6 includes those of N4 and N5. Lines resistant to N5 and N7 tend to be resistant to all other physiological races. N8 has the widest spectrum of all. Schematic diagrams illustrating the relationships and spectra of all the above races are provided and the results of the tests conducted in the Netherlands are compared with similar tests in other countries. From the total information to hand it would appear that a combination of resistance to N8 and N9 also confers resistance to races N1-N7. The occurrence in the field of different physiological races in 1947-51 was also studied. In the dry summers of 1947 and 1949 only race N1 occurred; wet seasons, on the other hand, led to a greater range of physiological races and, in this context, the question of the frequency of mutations from one race to another is discussed. N1 appears to be adaptable to a wider range of external conditions than any other race and is also less virulent than most other races.

Cultivated potato species and lines of wild species of different provenance, in particular of *Solanum demissum* and *S. antipoviczii*, were tested for their reactions to races N1-N9 of *Ph. infestans*. On the basis of these tests, and by crossing the different wild species *inter se* and with cultivated varieties, the following conclusions with respect to the genetical basis of resistance to *Ph. infestans* were drawn: (1) that the dominant factor R_8 controls resistance to races N1-N8; (2) that the dominant factor R_E controls resistance to race N1, to races N3-N6, and probably to race N9; (3) that the dominant factor R_7 controls resistance to races N1, N2, N4 and N7; and (4) that the dominant factor R_6 confers resistance to the same races as does R_E and may be identical with R_E . It is also considered highly probable that minor additive genes may influence the degree of resistance present, although no conclusive evidence for this hypothesis could

be found. Lines of *S. demissum*, for example *S. demissum* '29A,' were found that appeared to possess all the above-mentioned factors for resistance and would thus be resistant to all the known physiological races found in the Netherlands. The results of a number of crosses and back crosses of resistant *S. demissum* lines with cultivated varieties are presented in tabular form. The question of whether resistance to *Ph. infestans* is linked with undesirable characters, in particular with susceptibility to other diseases, such as wart, is also discussed. A form of *S. polyadenium* apparently resistant to all Dutch races of *Ph. infestans* was noted.

502 STEVENSON, F. J., AKELEY, R. V. & WEBB, R. E.

Reactions of potato varieties to late blight and insect injury as reflected in yields and percentage solids.

Amer. Potato J. 1955 : 32 : 215-21.

The yields of blight-resistant and susceptible varieties in Maine during 1953-54 are compared. In each year two susceptible varieties, Green Mountain and Katahdin, and four resistant varieties were planted. In 1953 the resistant varieties chosen were Sebago, Cherokee, Pungo and Kennebec and in 1954 Delus, Kennebec, Merrimack and Saco. In the non-blight year 1953 all varieties gave satisfactory yields, Kennebec proving superior. Five types of spray, water, DDT, basic copper, DDT + basic copper and DDT + Parathion, were applied. Plots sprayed with DDT or DDT + Parathion gave the highest yields; application of basic copper sprays tended to reduce yields in all the varieties tested. Potatoes from plots sprayed with DDT + Parathion had a lower percentage dry-matter content than those from the other plots. In 1954, a year of heavy rainfall, the susceptible varieties were heavily attacked by late blight soon after infection, the resistant varieties succumbing during the latter part of the growing season. Spraying increased the yields of the resistant varieties but those of the susceptible varieties were still negligible. The susceptibility of the hitherto resistant varieties is attributed to the appearance of new races of the pathogen; however, as infection occurred late in the season, yields were not reduced to any considerable extent.

503 LESZCZENKO, P.

Nowe biotypy *Synchytrium endobioticum* (Sch.) Pers. w Niemczech. [New biotypes of *S. endobioticum* (Sch.) Pers. in Germany].

Postępy Nauk Roln. 1955 : 2 : 96-98.

A review is given of work in Germany on

biotypes of *S. endobioticum* and on the resistance of some potato varieties to the fungus. In pre-war Poland a biotype slightly differing from biotype D was known and many potato varieties were resistant to it. In Germany the varieties Fram, Hilla, Fortuna and Fontana have been found to be resistant to all biotypes of *S. endobioticum*. The Polish variety Nowa Huta has proved resistant to biotype G.

The range of variation of *S. endobioticum* on different potato varieties, the virulence of the new and old biotypes from different localities and the reaction of the host were studied. The results showed that there are different kinds of resistance. The resistance of the potato variety Fram is apparently due to the fact that the zoospores of *S. endobioticum* cannot pass through the young epidermal cells.

- 504 JENSEN, J.
Forsøg med tidlige, brokimmune sorter af spisekartofler, 1950-1953. (**Trials of early, wart-immune varieties of potatoes for human consumption, 1950-1953**).
Tidsskr. Planteavl 1955 : 59 : 80-95.

Data are given on the yield, earliness and cooking quality of six varieties tested at three stations in Denmark. Arran Pilot gave the highest yield and was of medium cooking quality, while Saskia was equal in yield to the standard, Primula, and was of good quality.

- 505 HUIJSMAN, C. A.
Breeding for resistance to the potato root eelworm. II. Data on the inheritance of resistance in *andigenum-tuberosum* crosses obtained in 1954.

Euphytica, Wageningen 1955 : 4 : 133-40.
At Wageningen, Netherlands, data obtained from crosses involving *Solanum tuberosum* and *S. andigenum* indicate that the resistance of each of the *S. andigenum* clones CPC1673 and CPC1685 is determined by a single gene which is dominant in the simplex condition (cf. *PBA*, Vol. XXIV, Abst. 2181); in the *S. andigenum* clone Potozi 7, however, further genes appear to be involved.

- 506 BUKASOV, S. M.
(Breeding potatoes for resistance to Colorado beetle).
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 71-76. [Russian].

In addition to *Solanum demissum*, several species

of the group Commersoniana have been found to possess resistance to the Colorado beetle, although they do not contain demissin. Reference is made to work by Torka in which resistance was observed in seedlings of *S. schickii* (= *S. chacoense* Siambon) and in a number of other species. From this it is concluded that tests of resistance should be made on as many seedlings as possible of all available species and of interspecific hybrids.

Certain corrections of the systematics of *Solanum* species are proposed.

- 507 SILBERSCHMIDT, K. & ROSTOM, E.
A valuable indicator plant for a strain of potato virus Y.
Amer. Potato J. 1955 : 32 : 222-27.

After plants of *Nicandra physaloides* had been infected with necrotic fleck virus, a putative new strain of potato virus Y (cf. *PBA*, Vol. XXV, Abst. 3214), the young leaves developed distinctive symptoms different from those occasioned by other strains of virus Y. *N. physaloides* may therefore be of value in the identification of the new strain.

- 508 TIMIAN, R. G., HOOKER, W. J. & PETERSON, C. E.
Immunity to virus X in potato: studies of clonal lines.
Phytopathology 1955 : 45 : 313-19.

At Iowa State College, in an attempt to determine which of seven isolates of virus X was most effective for identifying susceptible clonal lines, X5 was found to be consistently efficacious in inducing both systemic and local symptoms in susceptible lines and XRS in inducing local lesions. Systemic infection occurred more often at 24° C. than at 16° C., and local lesions were more frequent at 16° C. Mechanical inoculation was found to be a more reliable means of testing for resistance than the graft method.

- 509 DOLEJŠ, B.
Negativní výběry v kulturách sadbových bramborů. (**Negative selection in crops of field potatoes**).
Za socialist. Zeměd. 1955 : 5 : 790-98.

At Havlíčkův Brod - Keřkov health and varietal purity of potatoes have been maintained by rigorous selection. Data on maturity, morphological characteristics and susceptibility to diseases of many varieties are presented. Ambra, Bojar, Kotnov and Blaník were resistant to black leg, *Rhizoctonia*, leaf drop streak, leaf roll and severe and mild forms of mosaic.

- 510 ROSS, H.
Über die Resistenz der Kartoffelsorten gegen das A-Virus auf der Basis Überempfindlichkeit. 2.Mitteilung: Pfropfversuche mit zwei verschiedenen Virus-A-Populationen und Feldinfektionsversuche. (**On the resistance of potato varieties to the A virus on the basis of hypersensitivity. Second report: grafting experiments with two different virus A populations and field infection experiments**).

Z. Pflanzenz. 1955 : 34 : 249-54.

Further investigations at the Max Planck Institute for Breeding Research, Voldagsen, Germany, on the reaction of a series of potato varieties to infection with virus A are reported (cf. *PBA*, Vol. XXIII, Abst. 2803). The following proved hypersensitive and field resistant: Adelheid, Benedikta, Carmen, Fichtelgold, Frühe Rosen [Early Rose], Imperator, Maritta and Nova. Although not hypersensitive, the varieties Virginia, Sieglinde, Apta, Olympia and Heida were found to possess a high degree of resistance to the virus. A strain of virus A isolated from Sabina gave the same reactions on 36 breeding clones of the Max Planck Institute as did the standard strain isolated from Allerfrüheste Gelbe [Yellow Earliest of All], indicating that the type of hypersensitivity associated with this latter variety is not broken down by the strain of virus A found in Sabina.

- 511 DEMPSEY, A. H., BRANTLEY, B. B. & SPEIRS, M.
Sweet potato performance trials in the Georgia Piedmont.
Mimeogr. Ser. Ga. Agric. Exp. Sta. 1954 : No. 3 : Pp. 6. (Mimeographed).

Tests were carried out on Georgia Bunch Porto Rico, Unit I Porto Rico, Heartogold, Goldrush, Allgold and Earlyport for total and marketable yields and contents of carotene, ascorbic acid and moisture. The last three varieties were superior to the two Porto Rico types in some characteristics (cf. *PBA*, Vol. XX, Abst. 2416 and Vol. XXIV, Abst. 1245) but the latter are still recommended for general use.

- 512 POOLE, C. F.
Sweet potato genetic studies.
Tech. Bull. Hawaii agric. Exp. Sta. 1955 : No. 27 : Pp. 19.

The discovery of a highly self-fertile seedling, HES107-C, a derivative of Nancy Hall x Porto Rico, provided the opportunity for genetical investigations. Ability *vs.* inability to flower and red *vs.* green stem each segregated according

to a 3 : 1 ratio. The following characters were each digenic: rooting *vs.* nonrooting, brown-skinned *vs.* cream-skinned roots, smooth *vs.* slightly lobed leaf margin, ridged *vs.* smooth roots and orange *vs.* cream-coloured flesh, a ratio of 9 : 7 being obtained for the first two of these character pairs and a ratio of 13 : 3 in the case of the last three. Only skin and flesh colour were associated. The number of anthers level with or above the stigma varied from 0 to 5, the parent seedling HES107-C having on the average three stamens with such anthers. A skewed distribution towards short length of vine suggested either geometric interaction of several gene pairs or partial dominance of shortness. Evidence was obtained of geometric interaction of several genes for time of flower production, with a skewed distribution towards earliness. Among the seedlings with fleshy roots low weight was dominant over high.

- 513 ARTHUR, J. C. (JUN.) & MCLEMORE, T. A.
Effects of processing conditions and variety on properties of dehydrated products.

J. Agric. Food Chem. 1955 : 3 : 782-87.

Details are given of the moisture, carotene, ascorbic acid, starch and sugar contents of the sweet potatoes Unit I Porto Rico, Goldrush, Earlyport and Maryland Golden before and after storage and dehydration.

- 514 EL-KATTAN, A. A. & STARK, F. C.
Tissue activity and structural differences in the storage roots of Maryland Golden and Jersey Orange sweet potatoes as related to cracking.
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 378-88.

Root cracking involves rupture of the inactive outer tissues, possibly as the result of internal pressure from the expanding vascular cylinder. Under conditions favouring formation of wound tissues, cracks may be rapidly healed. Jersey Orange is less susceptible to cracking than Maryland Golden. Compared with the latter variety, Jersey Orange has smaller xylem vessels surrounded by a nonactive parenchyma, a wider cambial ring, more compact parenchyma and greater number of secondary cambial areas. Moisture may be the chief factor limiting the activity of the outer tissues under field conditions. Tissue activity of root slices, as indicated by the wound tissue developed, may be determined in microenvironment chambers. It is suggested that testing of this activity provides the breeder with a useful method of evaluating susceptibility to cracking.

FIBRES

515 **New cotton varieties show good yields, fiber.**

Sth. Seedsman 1955 : 18 : No. 7 : p. 66.
The four varieties Moore's 1, 33, Special and Big Boll, developed by the Southern Fiber Service, Mount Gilead, NC, have lint of high quality and have all proved high-yielding and adapted to mechanical harvesting.

516 STRAUMAL, B.

(For a wider utilization of Mičurin's methods in cotton breeding).

Hlopkovodstvo (Cott.-raising) 1955 : No. 9 : 12-17. [Russian].

Breeding research on cotton in the USSR since 1930, including the writer's own experiments on the use of pollen mixtures, is described briefly. It was found that when 3-5 varieties supplied mixed pollen for pollination of emasculated flowers of another variety they were all liable to transmit their characteristics to the progeny. Pollinating flowers with the stamens left intact not later than 1.5 hours after the anthers opened gave 40-60% hybrids, but a further delay resulted in complete dominance of the seed parent. It was also observed that progenies from the first-formed fruits of the main inflorescences normally resembled the ♀ parent, the characteristics of the pollen parents being swamped. New improved forms of cotton were obtained by multiple hybridization, inter-specific crossing, multiparental pollination, vegetative hybridization and Mičurinist training. Mention is made of fine-fibre varieties resistant to *Fusarium*, large-bollled early types, forms producing coloured fibre and varieties possessing combined resistance to gummosis and wilt.

517 KNIGHT, R. L.

Cotton breeding in the Sudan.

Res. Mem. Emp. Cott. Gr. Corp. 1955 : No. 21 : 68-184.

Papers surveying breeding of Egyptian and Upland cottons in the Sudan are here assembled into a single publication (cf. *PBA*, Vol. XXIV, Abst. 3164 and Vol. XXV, Absts. 391 and 2198).

518 GREEN, J. M., OSWALT, E. S. & BILBRO, J. D.

Cotton variety tests 1950-1954.

Bull. Okla. agric. Exp. Sta. 1955 : No. B-454 : Pp. 15.

Varieties were studied in mechanically and hand-harvested tests at several centres in Oklahoma. Among the recommended varieties, Lankart 57, Lankart 611, Lockett 1 (Stormproof 1), Northern Star and Parrott are suitable for mechanical stripping.

519 HAWKINS, B. S., STEELE, T. E., BALLARD, W. W. & STACY, S. V.

Cotton variety tests, 1950, with five-year averages 1946-50.

Circ. Ga. Exp. Sta. 1951 : No. 168 : Pp. 11.

The results of trials of Empire WR, Coker 100 Wilt, Stoneville 2B and several other varieties at different centres in north and south Georgia are summarized.

520 KILLOUGH, D. T., RICHMOND, T. R. & ELLIOTT, F. C.

Performance of cotton varieties in Texas, 1951-53.

Bull. Tex. agric. Exp. Sta. 1954 : No. 788 : Pp. 13.

The results of trials carried out at 21 centres in Texas are summarized.

521 MANNING, C. W.

Selection techniques in cotton breeding.

Iowa St. Coll. J. Sci. 1955 : 29 : 461-62. (Abst.).

Parental varieties which ranked high for lint percentage, lint index, seed size and boll size tended to produce hybrids which also ranked high in these characters, the values obtained in the F_1 or F_2 being indicative of the values for later generations. Yields of later generations could not, in general, be predicted from the performance of the F_1 or F_2 , although hybrids with Deltapine as one parent gave consistently high yields in successive generations. Selection for yield on a single-plant basis proved ineffective.

The following phenotypic correlations are reported for the F_2 , F_3 and F_4 : (1) high lint percentage with high yield, high lint index, small seed and, to some extent, long weak fibre; (2) large boll with high lint index, large seed, coarse fibre and, to a lesser degree, long strong fibre; (3) strong fibre with small seed and low productivity; and (4) small seed with small boll. Genetic correlations were similar but those involving yield were inconsistent. The heritability of lint percentage ranged from 62 to 76%, suggesting that single plant selection for this character would be effective.

522 SANTHANAM, V.

A note on the behaviour of three inter-racial hybrids in *Gossypium arboreum* L.

Madras agric. J. 1952 : 39 : 383-86.

The F_1 of *G. arboreum* race *sinense* x *G. arboreum* race *cermum* evinced heterotic effects in respect of yield and the F_1 of *G. arboreum* race *burmani*-

cum x *G. arboreum* race *cernuum* was superior in boll production and yield of cotton to both its parents. In neither cross was heterosis observed in halo length, lint index or seed size. Heterotic effects observed in *G. arboreum* race *bengalense* x *G. arboreum* race *cernuum* were too small to be statistically significant.

523 BHOLA NATH

An apparent change from cytoplasmic to nuclear control of a form of chlorophyll deficiency in *Gossypium arboreum* L.

Nature, Lond. 1955 : 176 : p. 316.

Sixteen F_2 families obtained by fertilizing normal green ♀ types with pollen from a chlorophyll-deficient region of a variegated plant of *G. arboreum* race *bengalense* showed two types of behaviour at the Institute of Plant Industry, Indore. One F_2 family segregated in a 3:1 ratio for green and deficient plants. Data on the F_3 - F_5 confirmed the mode of inheritance as monogenic. The remaining F_2 families, however, consisted of only green plants, providing evidence of maternal inheritance of chlorophyll production.

524 SAUNDERS, J. H.

Bagging cotton flowers for breeding.

Emp. Cott. Gr. Rev. 1955 : 32 : 215-21.

The use of paper bags in selfing and crossing at the Shambat Station, Sudan, has resulted in much higher seed sets than the former practice of closing the corolla of selfed flowers by gumming and protecting the stigma after crossing by a twist of lint. With bagging, increases in both the number of bolls set and number of seeds per boll were obtained; the greater total seed production was partly independent of the reduction in bollworm damage.

525 Low, A.

A selfing technique especially suitable for raingrown cotton.

Emp. Cott. Gr. Rev. 1955 : 32 : 222-23.

At the Kadugli Station, Sudan, sealing the buds has been performed with 100% effectiveness by applying 1 g. shellac in 2 c.c. methylated spirit (95%) to the tips of the buds only.

526 GREEN, J. M.

Bumblebees breed cotton too!

What's New Crops Soils 1955 : 7 : No. 8 : 27, 34.

In this popular article it is pointed out that up to one half of the seed produced in cotton fields in North Carolina, Tennessee and Oklahoma is hybrid, chiefly through cross pollination by bumble bees. In an investigation in Payne County, Okla., three bumble bee species were

found to be involved, honey bees being ineffective as cross pollinators.

527 ARUTINOVA, L. & KANAŠ, M.

(Factors reducing sterile seed in cotton).

Hlopkovodstvo (Cott.-raising) 1955 : No. 8 : 43-47. [Russian].

Various other causes of sterile seed, besides the heritable characteristics of a variety, have been studied at the USSR Cotton Institute and agricultural methods of reducing it are discussed. For variety 108F good results were obtained by intravarietal hybridization and supplementary pollination. Varieties S7059 and S7010 of *Gossypium arboreum* had an outstandingly low percentage of sterile seed among all varieties and forms analysed. Data on the incidence of sterile seed in some Soviet varieties are presented.

528 SANTHANAM, V.

Heterosis effects in 'crinkled leaf' heterozygotes in *Gossypium arboreum* L.

Madras agric. J. 1952 : 39 : 444-47.

The crinkled leaf mutant (cf. *PBA*, Vol. XXI, Abst. 1989) was crossed with the normal parental form to study possible heterotic effects. The F_1 exhibited partial dominance for the character crinkled leaf and included plants with leaves possessing an intermediate degree of crinkling. The F_2 segregated in the proportion 1 crinkled : 2 intermediately crinkled : 1 normal. Plants with normal or crinkled leaves bred true in the F_3 but plants possessing leaves with an intermediate degree of crinkling again segregated in the ratio 1 : 2 : 1. Plants with crinkled leaves were taller, had a higher fresh and dry weight and possessed a larger number of nodes than normal plants. As, however, the leaves suffered from chlorosis, the yield of crinkled-leaved plants was adversely affected. The increases observed in the height and weight of the mutants are attributed to the pleiotropic effects of the *crA* gene and the additive effects of minor genes contributed by both parents.

529 ORUDŽEV, A.

(80 centners of raw cotton per hectare).

Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955 : No. 8 : p. 15. [Russian].

Mention is made of 2421, a new variety from the Azerbaidžan Cotton Institute. It is characterized by high yield, compact habit, earliness, drought resistance and large bolls, each weighing 6-6.5 g. The lint is 33-34 mm. long, its strength 4-6-4.7 g. So far 2421 has withstood attacks by jassids.

- 530 SIMOENS, M.
Rapport sur des champs d'essai de lin établis en Flandre occidentale au cours de l'année 1953. (**Report on trial fields of flax established in western Flanders during the year 1953**).
Rev. Agric., Brux. 1955 : 8 : 918-28.

Tabulated data are presented on the yields and fibre quality of 6 varieties tested at 3 centres in western Flanders in 1953. The order of yield in which the varieties were placed varied according to locality but Wiera, Solido and Arc-en-Ciel [Rainbow] appear to have given the best all-round performances, based both on yield and quality of their fibre. Formosa proved highly susceptible to lodging.

- 531 S'JACOB, J. C.
Research on the susceptibility of flax to flax rust (*Melampsora lini*).

Euphytica, Wageningen 1955 : 4 : 107-15.
By means of Flor's 18 differential flax varieties (cf. *PBA*, Vol. XXV, Abst. 1256), eight rust races and nine flax varieties with simultaneous resistance to all these races were identified in the Netherlands. Three further resistant varieties were found in later tests using seven of the eight races. Methods of testing for resistance are described.

- 532 BOTHUN, R. E.
A study of the inheritance of certain characters in a cross of two flax varieties as expressed in populations sprayed with 2,4-D.

Diss. Abstr. 1954 : 14 : Publ. No. 8444 1130-31.

Investigations were carried out on the varieties B5128 and Redwing and on their F_1 , F_2 , F_3 and back-cross progenies at the University of Minnesota. Compared with sprayed B5128, similarly treated Redwing showed a greater degree of stem curvature and took a longer time to recover from curvature but was less delayed in reaching the stage of full flowering and showed no effect upon height; delay in maturity was essentially the same in both parents. Segregation for each of the characters studied was observed in the F_2 and F_3 . On the basis of stem curvature or plant height, reaction to 2,4-D appeared to be inherited in a fairly simple manner and without phenotypic dominance. Multiple factors seemed to be responsible for reaction to 2,4-D when expressed in terms of duration of recovery from stem curvature and number of days to full flowering. The data further suggested that the parents differed with respect to multiple factors conditioning time of

maturity, with only a slight tendency towards partial dominance of later maturity. The low correlations obtained between the F_2 and F_3 values for stem curvature or number of days for recovery indicated that selection in the F_2 for reaction to 2,4-D on the basis of either of these factors would not be effective. Since all the correlation coefficients between the different characters were low, selection of segregates combining the desirable characters of both parents under conditions of spraying with 2,4-D was considered possible.

- 533 MOLINA ABELA, M.
El cáñamo. Trece años de experiencias sobre su cultivo. 1941-1953. (**Hemp. Thirteen years' experiments on its cultivation. 1941-53**).

An. Inst. nac. Invest. agron., Madr. 1955 : 4 : No. 1 : 1-132.

Varietal trials indicated the superiority of Fatsa, an introduction from Turkey. A monocious plant of this variety was observed in 1945 but the progeny grew feebly.

- 534 ARINŠTEĬN, A. I.
(**The question of breeding monocious hemp**).

Dokl. Akad. sel'skokhozjaistv. Nauk Lenin. (Proc. Lenin Acad. agric. Sci.) 1955 : No. 1 : 16-19. [Russian].

At the Institute of Fibre Plants, continuous selection for protandrous types with monocious flowers resulted in more uniform maturation and improved yield and quality of fibre in a central Russian variety. Selection work on some hybrid material is in progress.

- 535 DAS GUPTA, B. & GHOSH, K.
The genetics of jute (*Corchorus* sp.). VII. Inheritance of undulate leaf character in *C. capsularis* Linn.
Indian J. Genet. 1954 : 14 : 78-81.

Undulation of the leaf has been found to be determined by a single dominant gene, *W*. There is no evidence of linkage between this factor and *A* and *R* controlling pigmentation (cf. *PBA*, Vol. XXIV, Abst. 3175). The following genotypes with undulate leaves have been isolated: $CCAArrWW$, $CCAR^ARRRWW$ and $CCAR^ArrrWW$.

- 536 JONES, M. D., PUENTES, C. & SUAREZ, R.
Isolation of kenaf for seed increase.
Agron. J. 1955 : 47 : 256-57.

Pollination of kenaf in Cuba is effected chiefly by honey bees. Crossing between fields was found to be low but may occur at distances of 60 rods. A minimum isolation distance of 5

rods is recommended for commercial seed plantings, while small increase blocks for breeding should be completely isolated if possible.

SUGAR AND STARCH PLANTS

Proceedings of the Jamaican Association of Sugar Technologists for the years 1952 and 1953.

J.A.S.T. Journal : 16 : Pp. 35.

- 537 *Smith, C. E. M. Review of varieties—1952 crop. (pp. 4-6).*

The cane B34104 has declined in importance whereas B41227, B42231 and B4362 have increased considerably. The last three canes, however, are unsatisfactory in various respects; material from Barbados now under test with a view to selecting more satisfactory varieties is briefly described.

- 538 *Shannon, C. R. D. Millability of new varieties with special reference to the test of B-4362 canes. (pp. 7-10).*

The results of milling tests of B4362, B34104, B3439 and B41227 are reported.

- 539 *Smith, C. E. M. Variety selection in Louisiana. (pp. 16-18).*

Procedures and criteria used in sugar-cane selection at the Houma station are outlined.

- 540 *Smith, C. E. M. Review of variety performances. 1953 Crop. (pp. 19-25).*

Information is provided on the performance of varieties on the estates and in lattice square trials under commercial conditions. In the trials the E group with the parentage B35207 x POJ2878 did particularly well.

- 541 **Release of new sugarcane varieties CP48-103 and CP47-193.**

Sug. Bull., N. Orleans 1955 : 33 : 285-86.

The above two canes have been released for Louisiana. CP48-103 (CP29-320 x Co.290) is superior in earliness of maturity and sugar production per ton of cane to any commercial variety grown at present; it is suitable for fertile light soils only. CP47-193 (CP34-120 x CP36-211), similar in growth type to CP36-105, does best on heavy soils. Both varieties are resistant to mosaic and moderately resistant to red rot.

- 542 **Evaluation of sugarcane varieties CP48-103 and CP47-193 for milling and processing.**

Sug. Bull. N. Orleans 1955 : 33 : 286-87.

Compared with CP44-101, CP48-103 had the

percentage ratings of 98, 127 and 99 for sucrose extraction, TA 96° sugar per ton and fibre content respectively (cf. Abst. 541). For CP47-193 the ratings for these properties were 99%, 108% and 111%. CP48-103 gives a juice of fair clarity with the minimum amount of clarifier discharge; the juice of CP47-193 can be clarified well but only at a reduced processing rate.

- 543 *L., H.M.*

Cane research in Mauritius. Annual Report of the Mauritius Sugar Industry Research Institute, 1954.

Int. Sug. J. 1955 : 57 : 306-07. (Abst.).

The work mentioned in PBA, Vol. XXV, Abst. 3264 is referred to, special emphasis being placed on the proposal to reduce the area planted with M143/32 and to develop new early-maturing varieties with juice of a high sugar content. The new canes M311/41 and M311/45 appear promising in this respect.

- 544 **Twentieth annual report of the British West Indies Central Sugar Cane Breeding Station, Barbados for the year ending September 30th 1953 : Pp. 68.**

The results of seedling trials are reported in detail. Many further crosses involving complex parentages were effected.

The practical value of inbreeding followed by crossing is to be investigated; progress has already been made in developing selfed lines of Barbados varieties. Juice quality has been maintained during inbreeding. In some lines, vegetative characters have shown little variation after two generations of selfing.

The following 2n chromosome numbers were established: B603 and B2935, 80; B3337, 118; B3439, 105; B34104, 100; B35276, 120; B37161, 108; B37172, 119; B4098, 109; B41211, 123; B41227, 112; B4362, 118; B45151, 100; B4744, 115; B47419, 104; Raiatea (*Erianthus maximus*), 62; Tabongo (*Saccharum spontaneum*), Otaheite (= Bourbon) and Badila (original noble cane), 80; 28 NG251 (*S. robustum*), 84; 32MQ629 (*S. robustum* hybrid), 82; and EK28 from Java, 83. With respect to chromosome number the greatest differences between parent and selfs were shown by B35276 (Uba x POJ2878).

Study of stem-epidermis pattern, a useful auxiliary feature in varietal identification, continued. Some selfs which were almost indistinguishable in major morphological characters differed considerably in this pattern.

Memoria de la XXVII Conferencia Anual. Asociación de Técnicos Azucareros de Cuba. (**Report of the 27th Annual Conference of the Association of Sugar Technologists of Cuba**).

La Habana 1953 : Pp. 421.

Contributions presented to the conference included the following:—

- 545 Barreto, R. *Plan experimental con nuevas variedades realizado por la Estación Experimental de la Caña de Azúcar de Jovellanos*. (Plan of experiments with new varieties by the Jovellanos Sugar-cane Experimental Station). (pp. 27–30).

From the 8480 seedlings produced up to the year 1949, 36 have been selected as promising and are undergoing tests in different parts of Cuba; some of them show promise of being suitable for replacing POJ2878.

- 546 Agete Piñeyro, F. *Variedades de caña en Alto Cedro*. (Cane varieties in Alto Cedro). (pp. 31–34).

Information is given on the properties of the soil of the Alto Cedro zone of Cuba and on the results of variety tests with sugar cane carried out there; several of them have exceeded POJ2878 considerably in sugar yield.

- 547 Lizárraga Goñi, J. *Experiencias sobre la variedad de caña Pepe Cuca*. (Experiments on the cane variety Pepe Cuca). (pp. 35–43).

The popular Cuban cane Pepe Cuca was, it is revealed, produced by a private grower, Don José Sánchez Rodríguez (Don Pepe for short) and his wife Doña Cuca, who have recently been awarded a prize for their achievement. The characteristics of the cane are enumerated; it is more susceptible to the effects of drought and other climatic inclemencies than most canes; otherwise it gives better yields than POJ2878 and other canes with which it has been compared, its sugar content is higher and its behaviour in the factory is very good.

- 548 Warner, J. N. *El proyecto mundial de colección de variedades de caña de azúcar auspiciado por la Sociedad Internacional de Técnicos Azucareros*. (The world project for collecting sugar-cane varieties under the auspices of the International Society of Sugar Cane Technologists). (pp. 45–46).

The expedition to New Guinea in 1951 showed that the existing resources of sugar-cane germ-plasm have not by any means been exhausted and reference is made to resolutions made by

the International Society of Sugar Cane Technologists to organize further expeditions and to maintain a permanent living collection, if possible at Turrialba (cf. *PBA*, Vol. XXV, Abst. 1278).

- 549 García Baylles, J. L. *Acción de las radiaciones en la vida de los vegetales. Caña de azúcar*. (Action of radiations on plant life. Sugar cane). (pp. 57–66).

A condensed historical account of the development of atomic physics is presented and the action of solar radiation through photosynthesis and through effects on the chromosomes is analysed.

- 550 Fors, A. L. *La estación de cruzamientos en Barbados*. (The crossing station in Barbados). (pp. 379–84).

A description is given of the British West Indies Central Sugar Cane Breeding Station (cf. *PBA*, Vol. XXIV, Absts. 3186 and 3190) with an account of its work, special mention being made of cane 37161 and the success with which it is meeting in Cuba as well as in South America and the Caribbean islands.

- 551 ZABALA, S.
El “carbón” de la caña de azúcar. (Sugar-cane smut).
Idia 1955 : No. 87 : 1–11.

Extensive details on the degree of resistance of varieties grown in Argentina to *Ustilago scitaminea* are given. Highly resistant material is now available among introduced varieties and among the seedlings raised at Tucumán.

- 552 Forsøg med stammer af sukkerroe til fabrik. 1952–54. (Trials of sugar beet strains for factory use. 1952–54).
Tidsskr. Frøavl 1955 : 22 : 220–22.

Details are given of the performance of four Danish, one German and three Swedish varieties tested at various stations in Denmark. The two varieties giving the highest yields of sugar were Klein Wanzleben Poly and Maribo P.

- 553 GRINJKO, T. F.
(New varieties of sugar beet and methods of developing them).
Agrobiologija (Agrobiology) 1955 : No. 3 : 55–63. [Russian].

Recent selections from Verhnjačka are distinguished by good yields of root and high sugar content. For instance, the new variety V024, which has since been surpassed in performance by more recent selections, outyields the standard V1514 by 15 c. per ha. and has a 0.1% higher

sugar content. All the new varieties were selected from a multiple hybrid involving a Z type from Verhnjačka and an E type.

- 554 MCFARLANE, J. S.
The USDA sugar-beet breeding program in California.
 Spreckels Sug. Beet Bull. 1955 : 19 : 20-21.

An outline is given of work on resistance to bolting, *Peronospora schachtii* and to nematodes, the monogerm condition and the development of inbreds for the production of hybrids by means of cytoplasmically male-sterile lines.

- 555 JOHNSON, R. T.
Progress in Spreckels agricultural research program.
 Spreckels Sug. Beet Bull. 1955 : 19 : 22-24.

Sugar-beet improvement by Spreckels Sugar Company, Calif., now includes the development of F_1 hybrids and monogerm strains. The value of polyploid hybrids is being explored. By means of a method of paired crossing, strains showing improved resistance to *Peronospora schachtii* have been produced; composites of the best strains are to be tested under field conditions. Selection for capacity to germinate at low temperature has resulted in promising material, including a new commercial sugar beet of the S-2 type, which is a variety possessing resistance to bolting, downy mildew and curly top. The possibility of breeding for nematode resistance by using immune wild relatives is being investigated; selection within sugar-beet varieties for resistance to this pest did not meet with much success. Overwintering has several advantages for the grower in California; selections highly resistant to bolting are being tested in the San Joaquin Valley for their suitability for planting in September and harvesting the following summer.

- 556 PIOTROWICZ, M.
 Prace wstępne nad produkcją triploidalnych buraków cukrowych (*Beta vulgaris* L. v. *saccharifera*). [Preliminary work on the production of triploid sugar beets (*B. vulgaris* L. v. *saccharifera*)].
 Acta Soc. Bot. Polon. 1955 : 24 : 125-44.

At the Górka Narodowa Plant Breeding Station, near Kraków, colchicine was applied to the floral shoots of diploid beets to produce tetraploids. Cytological examination of the roots from the seeds thus obtained showed that of 353 plants, 83 were diploids, 188 triploids and 82 tetraploids. Of the selected tetraploids, some

were used for multiplication and some for trial crosses with different diploid types of sugar beets, to produce triploids.

The results from the reciprocal crosses between diploid PLR types and tetraploids differed, pure triploid progenies being obtained only when the tetraploid was the mother plant.

Triploid types have larger roots than the diploid whilst at the same time maintaining a good yield of sugar.

- 557 RUSCONI-CAMERINI, G.
 Osservazioni sulle correlazioni tra alcuni caratteri della barbabietola zuccherina con particolare riguardo ai tipi "P" e "Z." (Observations on correlations between some characters of the sugar beet with special reference to the E and Z types).
 Ann. Sper. agr. 1955 : 9 : 811-24.

Observations on two sugar-beet selections, representing the extreme E and Z types respectively, showed the Z type to be distinguished by greater density, larger number of vascular rings and smaller radius, the first two differences being statistically significant. A significant negative correlation was established between ring density and weight and total sucrose content, a positive correlation between ring density and sucrose % and purity. In general there was a positive correlation between number of rings and root weight and total sucrose but the values varied in the different types; radius was correlated positively with weight and total sucrose, and root weight positively with total sucrose and negatively with sucrose %.

- 558 VRŽEŠČ, E. S.
 (The role of the sugar-beet root in vegetative hybridization).
 Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 4 : 33-40. [Russian].

Grafting experiments at Biisk showed that mangel or sugar beet stocks induced heritable changes in sugar beet or mangel scions respectively. The plants used as grafting components were taken at the fourth leaf stage, the stock having all its leaves and its top removed. Changes observed in the first and second seed generations of a sugar beet grafted on a mangel are described. The first generation gave segregates in respect of root shape and colour, most plants having the shape and white root colour of sugar beet. Other plants resembled mangel in colour and sugar beet in shape and a few plants derived both these characters from the mangel. All the hybrid material showed a slight increase in the root weight and a reduction in

sugar content as against the control scions. But the upper and lower limits of variability in sugar content were somewhat raised for all types. The F_2 obtained by selecting the white root biotype for large roots and high sugar content showed appreciable improvements in root weight and sugar content over the control scions, its upper limit of variability in sugar content having risen to 19.3%. No selection was carried out among the coloured F_1 hybrids and even so the sugar content in the F_2 reached the upper limit of 19.1%. The coloured biotype gave segregates in respect of root colour in the F_2 , namely 69.7% mangel types and 30.3% sugar-beet types.

559 Kovács, A.

Über die Ursachen der unterschiedlichen Resistenz der Zuckerrübensorten gegen *Cercospora beticola* Sacc. (**On the causes of the differential resistance of sugar beet varieties to *C. beticola* Sacc.**). Phytopath. Z. 1955 : 24 : 283-98.

At the Sopronhorpács Plant Breeding Institute, Hungary, laboratory tests showed that water or dew collected from sugar beet leaves, or water in which sugar beet leaves had been immersed for some length of time, inhibited the growth of spores of *C. beticola* and *Alternaria tenuis*. Water that had been in contact with the leaves of resistant varieties inhibited growth to a greater extent than water taken from the leaves of susceptible varieties. It is postulated that sugar beet leaves emit a substance injurious to the germination and growth of the spores of both the above fungi and that varietal differences in susceptibility are due to differences in ability to produce this substance. No correlation was found between resistance and number of stomata per given area of leaf.

STIMULANTS

560 Istituto Scientifico Sperimentale per i Tabacchi. Relazione tecnica 1954. (**Tobacco Research Institute. Report of work for 1954**).

Tabacco, Roma 1955 : 59 : 159-91.

Work along the lines previously laid down (cf. *PBA*, Vol. XXV, Abst. 439) has continued. Comparisons have been made between different lines of the same variety; the hybrid Cucchetto x Gojano has been compared in the Verona district with the local standard variety Nostrano del Brenta; at Scafati good results have been obtained with the hybrid Manilla x Medan and the Maryland selection Chatterton. Two of Dojmi's selections from Xánthe Yaka [Xánthe

Foot-hills] are promising in respect of earliness and quality and some of Dojmi's Herzegovina selections are distinguished by high quality. Cytological studies have included an examination of the effects of extracts from seeds of *Nicotiana rustica*, *N. tabacum* and *Soja hispida* of varying ages and a cytogenetic study of polyploid *N. tabacum* and of hybrids of *N. tabacum* x *Nicotiana glutinosa*.

561 MANGIN, M. H.

Résultats expérimentaux obtenus sur tabac à la Station Expérimentale Agricole d'Isserville. (**Experimental results obtained on tobacco at the Isserville Agricultural Experiment Station**). Rev. int. Tabacs 1954 : Nos. 257-58 : unpaginated.

Unfavourable climatic conditions and poor soil in the Kabylie district of Algeria prevent the successful cultivation of high-quality foreign introductions; attempts are therefore being made to improve by selection and hybridization the leaf quality of local varieties and strains, the most important of which is Spaka (Spada 11-15). A number of promising lines have now been obtained both by line selection from local tobaccos and from crosses between local varieties and introduced Virginian and Oriental material.

562 HEGGESTAD, H. E. & CLAYTON, E. E.

Development of burley varieties of tobacco resistant to black shank, *Fusarium* wilt, wildfire, tobacco mosaic, and black root-rot. Phytopathology 1955 : 45 : p. 463. (Abst.).

The Burley varieties 11A and 11B (cf. *PBA*, Vol. XXIV, Abst. 3214) and 21 are described. The last named has resistance to *Pseudomonas tabaci* derived from *Nicotiana longiflora*, to *Thielaviopsis basicola* from *N. glutinosa* and to tobacco mosaic. The seedlings are usually vigorous, the growth habit erect and yield and quality good.

563 BOLSUNOV, I.

Die Schaffung von Tabaksorten ohne Blattachselknospen und die praktische Durchführung dieses Zieles. (**The production of tobacco varieties without axillary buds and the practical realization of this objective**). Fachl. Mitt. öst. Tabakregie 1955 : 1955 : 1-12.

This article is substantially the same as that summarized in *PBA*, Vol. XXV, Abst. 1291.

564 DE JONG, G. J.

Toetsproeven met nieuwe Kedu vormen.
(Tests of new Kedu types).

Bergcultures 1955 : 24 : 279-83.

The leaf yield of the high quality Kedu tobacco types was increased by crossing selected plants with productive hybrid lines raised by the CPV Experiment Station, Djember, East Java. The new varieties yielded 20-30% more than the parent Kedu strains, had longer and thinner leaves and, in the F_1 , produced tobacco equal in quality to that of the Kedu parent.

565 TAKENAKA, T.

(Cytogenetical studies of *Nicotiana* plants. IV. Meiosis in F_1 hybrids between *N. tabacum*, on the one hand, and 3 other species, on the other).Senshokutai (Chromosome)/Kromosomo.
1953 : Nos. 17-19 : 706-13. [Japanese].

F_1 hybrids of *N. tabacum* x *N. sylvestris*, *N. tabacum* x *N. glauca* and *N. glutinosa* x *N. tabacum* were investigated. The respective modal metaphase configurations were $3_{III} + 9_{II} + 9_I$, $2_{III} + 6_{II} + 18_I$ and $4_{II} + 28_I$, these observations agreeing well with those reported by Kostov (cf. *PBA*, Vol. XVI, p. 374).

566 SCARASCIA, G. T.

Effetti citologici di estratti acquosi di semi di *N. rustica*. (Cytological effects of aqueous extracts of seeds of *N. rustica*).

Tabacco, Roma 1955 : 59 : 201-08.

Extracts of seeds of *N. rustica* 'Tombac' collected in 1940, 1947, 1948 and 1953, when applied to onion root-tips, all had mitoinhibitory effects similar to those of seeds of *N. tabacum* (cf. *PBA*, Vol. XXV, Abst. 40); the intensity of the effect varied with the concentration of the extracts but was independent of the age of the seeds. Again no mutagenic action upon the chromosomes was observed.

567 RAEER, J. G. & BOLTON, A.

A new form of male sterility in *Nicotiana tabacum* L.

Nature, Lond. 1955 : 176 : 314-15.

Male-sterile plants, in which the flowers are characterized by petalody of the stamens and a slight reduction in corolla size and lighter colour compared with normal flowers, have arisen spontaneously in the flue-cured variety American Joiner grown from seed several years old at the Kutsaga Tobacco Research Station, Salisbury, S. Rhodesia. Even when rudimentary anther-like structures were present no pollen was found. This male sterility is being subjected to genetical investigation.

568 WOLF, F. A. & WOLF, F. T.

The chlorophyll content of certain flue-cured and Turkish tobacco varieties.

Agron. J. 1955 : 47 : 351-53.

The quantities of chlorophyll a and b in the green leaves of 5 Turkish varieties, 4 flue-cured varieties, 2 Burley types and one dark tobacco were determined by means of a spectrophotometer. Total chlorophyll content varied from 0.54 to 1.66 mg. per g. of fresh weight. The flue-cured varieties tended to have the highest chlorophyll content and the Burley types the lowest. Decrease in chlorophyll content during the initial stages of curing was greatest in the flue-cured varieties. Variation in chlorophyll content between plants of the same variety was greatest in Gold Dollar, Oxford 28 and Hicks, this fact indicating that chlorophyll content is genetically less stable in these varieties.

569 KADAM, B. S. & RADHAKRISHNAMURTY, B.

Inheritance of some leaf and flower characters in tobacco.

Indian J. Genet. 1954 : 14 : 54-67.

Studies carried out on a cross between Chatham and Ialomița at the Central Tobacco Research Institute, Rajahmundry, southern India, are reported. The production of petioles was determined by three complementary genes, Pt_a , Pt_b and Pt_c , the absence of one or more of which resulted in sessile leaves. A dominant factor, Bw , governed the development of a broad wing on the petiole. The production of auricles was determined by two duplicate genes, Au_1 and Au_2 ; when only one of these was present together with all three genes controlling petiolar growth only rudimentary auricles were developed. Au_1 was linked with Bw with a crossing-over value of about 32%. The large flower size of Ialomița was determined by Lc while an intensification of flower colour was controlled by two duplicate genes, Pki_1 and Pki_2 . A dominant gene Fd caused the flower colour to fade on withering. Local coloration of the anther filaments occurred as a result of the action of a dominant gene Ftp but was inhibited by a second dominant gene Itp .

570 ALCARAZ MIRA, E. & CARIDAD IGELMO, J. M.

Estudios genéticos sobre la combustibilidad del tabaco. (Genetic studies on the combustibility of tobacco).

An. Inst. nac. Invest. agron., Madr. 1955 : 3 : No. 4 : 1-586.

Extensive details of the results obtained in selecting varieties and hybrid progenies for

combustibility during 1947-52 are presented. In some varieties, such as Valencia and Maryland, selection led to little increase in combustibility; in some other varieties, notably Mammoth Gold and Sumatra, a significant improvement resulted. Among the hybrid progenies, particular promise was shown by lines selected from Valencia x hybrid 20.

571 Virginia growers to have new flue-cured tobacco.

What's New Crops Soils 1955 : 7 : No. 6 : p. 26.

The flue-cured variety Virginia 21, developed at the Agricultural Experiment Station of the Virginia Polytechnic Institute, Chatham, has large leaves suitable for cigarettes. It yields well and is resistant to certain unspecified root-rot organisms.

**572 DIACHUN, S. & VALLEAU, W. D.
Reaction of some species of *Nicotiana*
to tobacco mosaic virus, tobacco
streak virus, *Pseudomonas tabaci*,
and *Phytophthora parasitica* var.
nicotianae.**

Bull. Ky. agric. Exp. Sta. 1954 : No. 618 : Pp. 12.

The reactions of 48 *Nicotiana* species to inoculation with the above pathogens at the Kentucky Agricultural Experiment Station are recorded in table form and discussed with reference to the results obtained by other workers.

573 New tobacco possesses resistance to wildfire, available this season.

What's New Crops Soils 1955 : 7 : No. 6 : p. 26.

Developed by the Agricultural Research Service of the US Department of Agriculture in cooperation with the Tennessee Agricultural Experiment Station, Burley 21 is almost immune from wildfire and is resistant to tobacco mosaic and black root rot. It gives good yields of thin leaves suitable for cigarette tobacco.

574 GUALACCINI, F.

Una probabile mutazione del virus del mosaico del tabacco trasmessa, e forse anche prodotta, dalla *Cuscuta pentagona* Engelm. (A probable mutation of the tobacco mosaic virus transmitted, and perhaps produced, by *C. pentagona* Engelm.).

Boll. Staz. Pat. veg. Roma 1954 : 12 : 137-65.

Filaments of *C. pentagona* growing on a tobacco plant attacked by mosaic (*Nicotiana* virus I) were allowed to attack two other tobacco plants,

which became infected with the virus; on one of these, belonging to the variety Perustitza, the symptoms were different from those of the original mosaic and seemed to be those of a necrotic mutant of it. This view was supported by results of transmissions of the virus from the Perustitza plant to a number of differential hosts. Various alternative explanations of the origin of the necrotic virus are examined; the evidence presented seems to preclude the possibility that it was one of the ring-spot or necrotic viruses contained in the original infected plant, in the *Cuscuta* or in the Perustitza before infection, and to favour the view that the mosaic virus mutated within the *Cuscuta*.

575 SIMURA [SHIMURA], T., WATANABE, A. & KANOO [KANO], T.

(Physiological studies on the resistance to cold of the tea plant).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 23 : 121-27. [Japanese].

The reaction of two triploid and four diploid varieties to artificially controlled low temperatures in a refrigerator was ascertained during November 1952 to March 1953. In all cases, resistance increased to a maximum in February and thereafter declined. Resistance was correlated with the content of reducing sugar in the leaf and with the refractive index of the cell sap. Varietal differences in resistance were conspicuous in February but largely disappeared during March. The most resistant varieties were the triploids: Makinoharawase [Makinohara Early] and U-21.

576 GARCÍA BECERRA, C.

Las investigaciones en cacao. (Investigations on cacao).

Cacao en Colombia 1954 : 3 : 11-19.

The work of selecting the best trees from the mixed populations of hybrids of Criollo x Forastero and the studies of incompatibility have continued (cf. *PBA*, Vol. XXV, Absts. 2279 and 3315-6).

577 NAUNDORF, G.

Contribución a la fisiología de la floración en cacao. Existencia de hormonas de floración. (Contribution to the physiology of flowering in cacao. Existence of flowering hormones).

Cacao en Colombia 1954 : 3 : 29-34.

An account is given of experiments in which the sterile trees that bear no flowers (cf. *PBA*, Vol. XXV, Abst. 3316) were induced to do so by grafting on to them flowering shoots from trees that flower abundantly. The flowers so induced

bore fruit and the effect is attributed to the transfer of a hormone inducing flowering.

- 578 GONZÁLEZ H., C. A.
Contribución a la polinización artificial en el cacao. (**Contribution towards artificial pollination in cacao**).

Cacao en Colombia 1954 : 3 : 167-82.

No set was obtained from flowers pollinated with an aqueous suspension of pollen, either with or without the addition of compounds designed to inactivate substances inhibiting pollen germination (cf. *PBA*, Vol. XXIII, Abst. 2888) or of yeast extract to encourage pollen growth. The pollen in the suspension nevertheless germinated well on dextrose-agar plaques. Attempts to induce self pollination by enclosing the flower and applying air under pressure also failed.

- 579 NAUNDORF, G.
Nuevas contribuciones al estudio de la auto-incompatibilidad en cacao. (**Further contributions to the study of self incompatibility in cacao**).

Cacao en Colombia 1954 : 3 : 63-72.

A number of self-incompatible trees set seed by self pollination after flowering shoots of a self-compatible tree had been grafted on to them.

- 580 BUELVAS CABRALES, R. A.
Un árbol de cacao con frutos partenocárpicos en el Valle del Cauca. (**A cacao tree with parthenocarpic fruits in the Cauca valley**).

Cacao en Colombia 1954 : 3 : 93-105.

The tree described is a Forastero of the Calabacillo or Amelonado type. It flowers profusely but the flowers are without anthers and all the fruits are parthenocarpic. A large number of cross pollinations were made but all flowers so treated fell off almost immediately. Grafts of flowering shoots of fertile trees failed to take but nevertheless induced the formation of a certain number of stamens in the flowers of the parthenocarpic tree; these flowers, however, still failed to set fruits when cross pollinated. The parthenocarpy is attributed to genetic factors leading to physiological disturbances, possibly involving an excess of certain growth substances.

- 581 KNIGHT, R. & ROGERS, H. H.
Recent introductions to West Africa of *Theobroma cacao* and related species. I. A review of the first ten years.

Emp. J. exp. Agric. 1955 : 23 : 113-25.

An account is given of the yields, pod and bean characters and behaviour in crosses of various

types of *Th. cacao* and related species introduced to the Gold Coast from South America during the last ten years.

- 582 RUSSELL, T. A.
The kola of Nigeria and the Cameroons.

Trop. Agriculture, Trin. 1955 : 32 : 210-40.

The edible kola nuts occurring in Nigeria and the British Cameroons are classified under four species, viz. *Cola acuminata*, *C. nitida*, *C. anomala* and *C. verticillata*, information being given not only on their botanical features but also their distribution and uses. Three forms of the most important species, *C. nitida*, are described. Attention is drawn to the possibility of obtaining higher yields by individual-tree selection of *C. nitida*. A study of the causes of low fruit production in this species indicated that pollination was often ineffective. The presence of some form of incompatibility system is suspected. Pink seed colour is dominant to white, and red dominant to both white and pink.

Annual Report of the Department of Hop Research, Wye College, 1954 (1955) : Pp. 129.

- 583 Neve, R. A., Farrar, R. F. & Salmon, E. S. *Plant breeding section. Review of the year's work.* (pp. 14-21).

Several of the new seedlings listed gave high percentages of soft resins. Very early-maturing seedlings are being developed; should these prove to be up to commercial standard they should be much in demand for machine-picking.

Testing of selections for tolerance of *Verticillium* wilt continued, in cooperation with East Malling Research Station.

Males from crosses of Nonsuch (DB53) with wilt-tolerant males are to be tested in an attempt to obtain males more highly tolerant of this disease than those now available. A trial is to be carried out on seedlings from 4n Bullion x 2n wilt-tolerant males to study the value of the ♂ parents in breeding and to select commercially promising females tolerant of wilt.

Triploids of Bullion and Brewer's Gold tend to fall within the same commercial class as their parental varieties but since the trade demand for the latter is limited emphasis is being laid on the production of triploids of Goldings and Fuggles.

- 584 Beard, F. H. & Salmon, E. S. *Some new varieties of hops in Wye field plots, Wye College.* (pp. 22-31).

Data are given on each of 33 varieties with respect to (1) yield of dried hops per acre, (2)

appearance and aroma of the dried sample, (3) soft-resin content, (4) vigour and other cultural characteristics and (5) susceptibility to downy mildew and mould. The varieties consist of seedlings from Canterbury Golding ♀ x OB21 (Brewer's Gold 'C9a') and open-pollinated derivatives of Oregon Cluster, *Humulus americanus* var. *neomexicanus* and the wild Manitoba hop BB1.

585 Neve, R. A. & Farrar, R. F. *Progress in hop breeding*. (pp. 32-43).

Tetraploids of Bullion and Brewer's Gold have been readily obtained by treating buds with colchicine, layering the lateral shoots, taking cuttings from the layered bines and isolating $4n$ tissue by basal cuttings of bines selected on account of their production of $3n$ seedlings when open-pollinated. Layering and taking cuttings should be carried out as soon as possible after colchicine treatment to prevent elimination of $4n$ by $2n$ cells. Treatment of other varieties was however less successful. According to later experiments, use of a higher concentration of colchicine (0.75%) is likely to be more successful, although leaving only one bud per shoot instead of eight for treatment and extending the period of application to 4 instead of 3 days appear to offer no advantages. Seedlings obtained from colchicine-treated material have consisted of $2n$, $3n$, $4n$, $5n$ and aneuploid individuals, the occurrence of $4n$ seedlings from controlled crossing being much more frequent than from open pollination. At present no explanation of the production of the $4n$ plants can be offered. Study of sex ratios in polyploid families continued.

Female $3n$ seedlings of Bullion have shown a high degree of uniformity and closely resemble the parent variety in field characteristics, aroma and preservative value. Eight of the ten triploids tested in small-scale brewing trials were equal or superior to $2n$ Bullion. Triploids contain much fewer seeds than diploids. Triploids of both Bullion and Brewer's Gold have proved to be more vigorous than their ♀ diploid ancestors. Problems likely to be involved in the commercial use of triploids are discussed.

586 Beard, F. H. & Thompson, F. C. *The testing and selection of Fuggle and Golding clones*. (pp. 44-49).

An account is given of the origin of the clones forming the present collection of Fuggle and Golding selections at Wye and of plans for the future testing of this material. All the Fuggle selections have displayed freedom from the viruses nettlehead and split leaf blotch and have been little affected by downy mildew.

Early and midseason clones have been obtained, and in the case of Golding, also late-maturing selections.

587 Beard, F. H. & Thompson, F. C. *Observation trials with the new varieties of hops*. (pp. 50-52).

Notes are provided on the performance of Pride of Kent, John Ford, Malling Midseason, Northern Brewer, College Cluster and Early Choice during 1952-54 in a trial established in a hop garden at Sissinghurst, Kent. A second trial of six varieties is being established near Farningham, also in Kent.

588 Thompson, F. C. *A survey of recent hop research in countries outside England*. (pp. 90-96).

Hop research in Europe is now coordinated by a scientific commission which is a subcommittee of the European Hops Cultivation Committee; England, Belgium, France, Germany, Yugoslavia and Spain are represented on the commission. Breeding and other investigations in member and nonmember Continental countries are briefly surveyed.

589 Beard, F. H. & Salmon, E. S. *Appendix I. Detailed notes on some new varieties of hops in Wye field plots, Wye College*. (pp. 97-120).

Full details are given on the origin and performance of the 33 varieties referred to in Abst. 584.

590 Salmon, E. S. *Appendix II. The challenge cups for new varieties of hops*. (pp. 120-25).

The results of the 1954 competition among growers are reported.

591 THOMPSON, F. C.

An appraisal of the new (Wye) varieties of hops and their place and future in brewing.

J. Inst. Brew. 1955 : 61 : 210-16.

Hop breeding carried out at Wye College, Kent, since 1920 is surveyed. The chief current breeding objective is wilt resistance, other aims being resistance to shattering, suitability for machine picking and the production of tetraploids which, when crossed with wilt-tolerant diploid males, will give hybrids that retain the aroma and other desirable qualities of the female parent.

592 LIMBERK, J.

[Change of sex in hop plants (*Humulus lupulus*)].

Čeh. Biol. (Czech. Biol.) 1954 : 3 : 252-55. [Russian].

In Prague directed sex changes from ♂ to ♀

were obtained in ♂ hop stocks worked with ♀ scions.

MINOR CROP PLANTS

593 GENTRY, H. S.

Introducing black pepper into America.

Econ. Bot. 1955 : 9 : 256-68.

Because of the decline in the cultivation of pepper (*Piper nigrum*) in southern Asia and the resulting scarcity, collections have been made along the Malabar coast and adjacent areas in Coorg, western Madras and Travancore-Cochin with a view to introducing the crop into tropical American countries. Descriptions are given of the cultivated varieties and wild specimens introduced. The considerable genetic variability observed among both wild and cultivated plants suggests that scope exists for breeding varieties for particular environments and for suitability for modern cultural methods.

594 G2. Another new strain in chilli.

Andhra agric. J. 1954 : 1 : p. 112.

Guntur 2 (Chilli 1402), selected at the Lam Agricultural Research Station, Andhra, from Pusa 46, is superior to G1 and to local strains, is more tolerant of thrips and has longer fruits with a persistent calyx. It is suited to rainfed conditions.

595 GAZENBUŠ, V. L.

(Species of pepper—*Capsicum* Tournef.).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 60-70. [Russian].

On the basis of a study of a large collection of peppers at the Institute of Plant Industry, Leningrad, a new classification is presented, in which the genus *Capsicum* is divided into two subgenera, *Campanulatum* with one species, *C. bolivianum*, and *Rotatum* with four, *C. mexicanum*, *C. peruvianum*, *C. colombianum* and *C. pubescens*; each of the species is described, with indications of synonymy and geographical distribution.

596 Winterkoolzaad, 1955. (Winter rape, 1955).

Landbouwvoorlichting 12 : Bijl. 9: Ber. Rassenkeuze 1955 : No. 188 : unpaginated.

The results of trials of four varieties on different types of soil in the Netherlands are presented. Dippe's Platzwiderstandsfähiger [Dippe's Indehiscent] gave the highest yields, followed by Lembke.

597 SINGH, D. & MEHTA, T. R.

Studies on breeding brown sarson. I. Comparison of F₁s and their parents.

Indian J. Genet. 1954 : 14 : 74-77.

The results of diallel crossings among six strains of brown-seeded *Brassica campestris* var. *dichotoma* at the Government Research Farm, Kanpur, India, are reported. A number of combinations exhibited heterosis in respect of yield.

598 SINGH, D.

Inheritance of a new type leaf in rape.

Curr. Sci. 1955 : 24 : 237-38.

In yellow sarson, a type of leaf characterized by a small terminal lobe having an acute apex, incisions in the lamina that do not reach the midrib and upper lobes forming an acute angle with the midrib was partially dominant over the normal type and depended upon a single gene (N).[^]

599 NAKAZAWA, A. & OGAHARA, S.

(Studies on injury to rape caused by moisture. On varietal differences in the oxygen consumption of some rape varieties).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 23 : 128-31.

Three Japanese varieties were compared for rate of oxygen uptake and amount of water absorbed by the cotyledons when the seedlings were submerged under water. With regard to the two varieties Norin [Ministry of Agriculture and Forestry] 15 and 16, the oxygen consumption of the former was greater at first but less later on.

600 Custer castor bean adapted for dry-land and irrigated farms.

What's New Crops Soils 1955 : 7 : No. 9 : p. 29.

Released by the Oklahoma Agricultural Experiment Station, Custer combines early maturity and desirable plant type with resistance to shattering.

601 Palmetto sesame variety from South Carolina.

Sth. Seedsman 1955 : 18 : No. 6 : 28-29.

Palmetto sesame suited to combine harvesting: released in Southeast.

What's New Crops Soils 1955 : 7 : No. 8 : p. 33.

Developed at the South Carolina Agricultural Experiment Station from several nonshattering varieties, Palmetto is nonshattering and resistant to drought, root-knot nematode and wilt but susceptible to *Alternaria*, *Cercospora* and

bacterial leaf diseases. Oil content of the seed is about 48% and protein content 28% (cf. *PBA*, Vol. XXV, Abst. 3334).

602 Rio sesame released to certified growers: is adapted in Texas.

What's New Crops Soils 1955 : 7 : No. 8 : p. 33.

Rio, a nonshattering variety, developed at Texas Agricultural Experiment Station, compares favourably in yield with shattering varieties under good growing conditions. Its oil content is 49% (cf. *PBA*, Vol. XXV, Abst. 3334).

603 RAMANATHAN, K.

A note on the interspecific hybridization in sesamum.

Madras agric. J. 1950 : 37 : 397-400.

In view of the susceptibility of cultivated species of *S. indicum* ($n = 13$) to *Antigastra catalaunalis* and virus diseases and the comparative resistance of the wild species *S. prostratum* ($n = 16$), *S. laciniatum* ($n = 16$), *S. radiatum* ($n = 32$) and *S. occidentale* ($n = 32$) to these pathogens and to drought, a number of interspecific crosses were carried out at the Agricultural Research Institute, Coimbatore, to obtain information on crossability within the genus *Sesamum*. In crosses between species with the same chromosome number, a high seed-set was obtained and the F_1 was fully fertile. In the crosses *S. indicum* x *S. laciniatum* and *S. indicum* x *S. prostratum*, a few viable seeds were obtained but the F_1 plants were, almost without exception, sterile. In the crosses *S. occidentale* x *S. indicum* and *S. occidentale* x *S. laciniatum*, i.e. crosses in which the chromosome numbers of the parents were widely divergent, only nonviable seeds were obtained. Crosses in which the plant with the lower chromosome number was used as the ♀ parent, e.g. *S. indicum* x *S. occidentale* and *S. laciniatum* x *S. radiatum*, failed completely as the reproductive organs dropped off almost immediately after fertilization. The F_1 hybrid ($2n = 13 + 16$) *S. indicum* x *S. laciniatum* inherited the resistance of the wild parent to diseases and pests but proved completely sterile. A fertile amphidiploid of this cross was however obtained by treating the buds with an aqueous colchicine solution and it is hoped that the progeny of this amphidiploid may be of value in future breeding experiments.

604 DESHPANDE, R. B. & JESWANI, L. M.

Inheritance of resistance to wilt (*Fusarium lini* Bolley) in linseed.

Curr. Sci. 1955 : 24 : 202-03.

Results obtained at the Indian Agricultural Research Institute, New Delhi, from crossing

resistant and susceptible varieties suggest that resistance is determined by two duplicate dominant genes.

605 MERRILL, S. (JUN.), LAGASSE, F. S., NEFF, M. S. & KILBY, W. W.

Relative growth and yield of budded and seedling tung trees for the first seven years in the orchard.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 119-27.

Tests were carried out at four centres in the southern USA to compare the performance of budded trees and open-pollinated seedlings of eight mother trees. Seedlings gave higher average yields of fruit than clonal progenies, chiefly or wholly as the result of their greater tree size. Considering the overall average, the oil content of fruit from budded trees did not differ appreciably from that of fruit from seedlings. Mother-tree genotype affected growth, yield and oil content; a significant interaction between method of propagation and this mother-tree effect was also detected.

606 POTTER, G. F., SITTON, B. G., MERRILL, S. (JUN.), WRIGHT, R. E. & JOHNS, D. M.
Cold injury to young tung trees in northern Louisiana.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 179-81.

Data were obtained on cold injury to budded and seedling progenies of mother trees which had exhibited cold resistance above the average in regions of commercial cultivation in the USA. The results suggested that unless favourable winters follow planting, difficulty is likely to be encountered in raising the trees to maturity.

607 MJAKUŠKO, JU. P.

(Mass raising of hybrid seed in sunflower on an agricultural scale).

Zemledelie (Agriculture) 1955 : No. 7 : 111-12. [Russian].

A labour-saving method of raising F_1 seed, applicable to varieties giving equally productive direct and reciprocal hybrids, is described. The seed of varieties recommended for crossing in a given district is mixed in equal proportions and the plants raised in a field nursery. Diseased and underdeveloped plants are rogued, leaving all others to cross-pollinate. The seed yield may be further improved by supplementary pollination. In the Crimea, the amounts of F_1 seed of VNIIMK 8931 [Oil Industry 8931] x Fuksinka 62 and of VNIIMK 1646 x VNIIMK 6540 produced as above without supplementary pollination, were only slightly below those

obtained by the customary method of growing in alternate rows.

- 608 ČUHNIN, JU. A.
(**Sowing in late autumn as a method of improving the properties of sunflower seed**).

Agrobiologija (Agrobiology) 1955 : No. 2 : 114-15. [Russian].

Saratov 106 and Šortanda 41 showed improvements in diameter of the seed-heads, 1000 seed weight and seed yield when raised from the seed of plants sown in the previous season in late autumn instead of spring. The oil content was also slightly improved and the husk percentage reduced.

- 609 ŽDANOV, L. A.
(**The question of evaluating the élite seed and improving the heritable characteristics of sunflower varieties**).

Zemledelie (Agriculture) 1955 : No. 7 : 62-67. [Russian].

The contention of the article on this subject by Maksimčuk (cf. *PBA*, Vol. XXV, Abst. 2894) is rejected. Mention is made of achievements at various institutes in improving varietal material, in particular, raising the oil content of some sunflower varieties by intervarietal open pollination and other Mičurinist methods.

- 610 PUTT, E. D. & SACKSTON, W. E.
Rust resistance in sunflowers (*Helianthus annuus* L.).

Nature, Lond. 1955 : 176 : p. 77.

In investigations at the Morden Experimental Station, Man., three sources of rust resistance have been found, viz. Sunrise x Texas Wild Annual, California Oilseed x Texas Wild Annual and Hopi.

- 611 PROHOROV, K. I.
(**The method of breeding the sunflower varieties Zelenka 368 and Černjanka 76**).

Zemledelie (Agriculture) 1955 : No. 6 : 90-94. [Russian].

The new varieties combine *Orobanche* resistance and high oil yield. They were obtained at the Veidelevskoe Field Research Station by continuous selection among hybrid populations bred from varieties resistant to *Orobanche*, grey-seeded forms in the case of Zelenka 368 and black-seeded ones in the case of Černjanka 76.

- 612 **Safflower. A drought resistant oil seed crop for the wheat belt?**

Rur. Res. CSIRO 1955 : No. 12 : 2-5.

A short account of safflower breeding in Australia is included. Introductions from

Egypt, Sudan, Syria and Israel have proved particularly valuable as sources of genes for high oil content and early growth habit. Types with an oil content of over 40% have been selected. A form giving high-quality edible oil has been discovered. Selections for yield have produced 3000 lb. of seed per acre under experimental conditions. Breeding is in progress to combine several desirable characters in single varieties. So far it has not been possible to combine maximum seed yields and the highest oil contents.

- 613 VENKOBA RAO, M. & NAGESWARA RAO, P.

Inheritance of a new type of floret colour in safflower.

Andhra agric. J. 1954 : 1 : 364-65.

The pale yellow floret colour observed in a variety grown at the Nandyal Agricultural Research Station, Andhra, appears to be determined by a single gene recessive to the two alleles controlling orange and red floret colour.

- 614 PRONK, F.
Vergelijkend trosanalytisch onderzoek van enkele typen van de oliepalm (*Elaeis guineensis* Jacq.). [Comparative analytical investigation of the bunches of several types of oil palm (*E. guineensis* Jacq.)].

Bergcultures 1955 : 24 : 323-29.

Further to previous experiments (cf. *PBA*, Vol. XXIV, Abst. 2352), the yield and composition of the fruit of several types of *E. guineensis* were investigated. Correlations established in the previous experiments were confirmed.

- 615 **Second Annual Report of the West African Institute for Oil Palm Research 1953-54 : Pp. 99.**

There is evidence that rate of germination of the seed increases with length of storage while viability generally decreases. Viability also decreases through exposure to temperatures below 10° C. before sowing.

Selected trees of the *tenera* type have been crossed with selected *pisifera* trees with the aim of obtaining *pisifera* males suitable for further breeding. *Dura* and *tenera* trees have been pollinated with pollen from the dumpy strain of the Deli palm. The inheritance of the leaf character of the variety *idolatraca*, in which the leaflets are partly fused, is being investigated. As a result of segregation studies, it is concluded that *tenera* forms and the intermediate types designated inter-*tenera* and hitherto regarded as distinct belong to the same natural population. Over the period 1950-53, Nigerian palms have yielded nearly two-thirds more than Malayan

strains of Deli palm, but the latter are superior in fruit and bunch composition. However, the Malayan Deli strain 19 x 65 has given high yields and is being used for further breeding. Deli palms produce fewer leaves than Nigerian strains, show a greater tendency towards flower abortion and have a lower ratio of number of female inflorescences to total number of leaves. In pollen storage studies, sun drying resulted in higher viability, both before and after storage, than drying *in vacuo* or even drying at 45° C. At a storage temperature of 5° C., the optimum relative humidity was 35–40%; under these conditions 20% of the pollen was still viable after 14 months, the critical level for satisfactory fruit-setting being about 10%.

616 DONKERSLOOT, M. E.

Misvormingen bij oliepalmen. (**Deformities in oil palms**).

Bergcultures 1955 : 24 : 267–78; 295–304.

At the Avros Experiment Station, Medan, Sumatra, a wide range of crosses in all possible directions between the five Deli *dura* clones 217, 861, 912, 936 and 1205 and the Import *tenera* clone SP540 were carried out to obtain information on the inheritance of crown disease and abnormal stunted tree growth. Both these conditions are thought to be genetically determined and not due to a parasite or virus. All the six above-mentioned clones were selfed in the first instance and from these selfings completely healthy trees were selected for inter-clonal crosses. Crown deformities occurred almost exclusively in the progeny of Deli *dura* x Deli *dura* crosses; Import *tenera* x Import *tenera* progeny were almost free from crown disease but included a large number of non-fruited stunted trees. Crosses between Deli *dura* and Import *tenera*, and the reciprocal, gave as low a percentage of trees with stunted growth and other deformities, apart from deformed crowns, as the *dura* x *dura* crosses. No statistically reliable information is available on the incidence of crown deformities in *dura* x *tenera* crosses. It is suggested that by means of crosses between suitable mother trees, the incidence of stunted, non-fruited trees in a plantation may be reduced.

617 CHERUBINI, C.

Números de cromosomas de algunas especies del género *Prosopis* (Leguminosae - Mimosoideae). [**Chromosome numbers of some species of the genus *Prosopis* (Leguminosae - Mimosoideae)**].

Darwiniana, B. Aires 1954 : 10 : 637–43.

Chromosome studies in 18 species and three

unidentified specimens within four different sections of the genus showed them all to have $2n = 28$, though polysomatic cells with $2n = 56$ and occasionally ± 112 were frequent in all species except *P. alata*.

618 HILLS, K. L., BOTTOMLEY, W. & MORTIMER, P. I.

Variation in the main alkaloids of *Duboisia myoporoides* and *D. leichhardtii* F. Muell. II. *Duboisia myoporoides*. III. *D. leichhardtii*. IV. Interspecific hybrids.

Aust. J. appl. Sci. 1954 : 5 : 258–91.

Among the progenies of individual trees of *D. myoporoides* originating from all parts of its area of distribution and grown in Queensland and Canberra, genetical and environmental factors appeared to be equally important in determining the relative proportions of different alkaloids. Genotypes occurred, however, in which hyoscyne, hyoscyamine and nor-hyoscyamine, respectively, remained the chief constituent alkaloids over a wide range of environmental conditions. Southern types were less variable in alkaloid content than northern. *D. leichhardtii* was similarly variable.

Some of the F_1 clones of the cross between *D. leichhardtii* and a northern type of *D. myoporoides* were more vigorous during early years of growth and produced a higher percentage of total bases in their leaves than either parent. The F_2 progeny from an F_1 plant with high hyoscyamine content segregated for content of total bases, high hyoscyamine content and high hyoscyne content; there was evidence of transgressive segregation for total bases. A cross between *D. leichhardtii* and a southern form of *D. myoporoides* resembled the above cross, but total bases were no higher than in the parents; very high hyoscyamine contents were present. Data on the alkaloids of naturally occurring intermediates between the two species do not conflict with the view that the intermediates are hybrids. Natural crossing occurred fairly readily when the two species were grown in adjacent plots.

619 CHANDLER, C. & BARTON, L. V.

The morphology and physiology of diploid and tetraploid *Plantago ovata*. Plant Physiol. 1955 : 30 : Suppl. ix–x. (Abst.).

The leaves of the tetraploids produced a dark brown exudate which originated internally and was accompanied by degeneration of the tissue (cf. *PBA*, Vol. XXV, Abst. 1328). Chromatographic analysis revealed no significant differences between $4n$ and $2n$ plants in free aminoacid

contents of the leaf and stem tissues. The tetraploids were more sensitive to adverse conditions for growth. Their flowering was hastened by limiting the water supply, exposing the seedlings to 5°C. or increasing the photoperiod. The diploids, which were usually earlier flowering, were less affected by these treatments.

Report of the work of the Rubber Research Board in 1954.

Rubb. Res. Inst. Ceylon 1955 : Pp. 141.

- 620 *de Silva, C. A. Report of the Botanical Department for the year, 1954. (pp. 34-68).*

The early selection of clones in large-scale trials involving a limited number of trees of each clone has proved highly successful. The local clones Nab 12, 15, 17 and 20 continued to equal PB86 in yield. Of the foreign clones tested, AVROS 255, AVROS 352, RRIM 501, RRIM 513, PR 107, PB6/50 and Lun N have given high yields. PR 107 has shown some resistance to *Oidium* and possesses good bark characteristics.

Clonal seedlings of various origins produced promising yields compared with the budded control, Tji. 1.

Further evidence of the high yielding ability of clones in the RLD series was obtained.

- 621 *Van Emden, J. H. Notes on the incidence and control of Oidium heveae in Ceylon. (pp. 75-83).*

Clone LCB870, resistant to *Oidium* at the usual altitudes at which rubber is grown, may be attacked above 2000 ft. Seedlings from hand pollinations between LCB870 and high yielding clones have been planted.

- 622 **RESING, W. L.**
Variability of *Hevea latex*.

Arch. Rubb. Cult. 1955 : 32 : 75-212.

After a short historical account of the methods used in Indonesia since 1910 to produce (1) primary clones from promising mother trees of unknown parentage and (2) secondary clones from seedlings resulting from controlled crosses between selected parents, literature on the chemical composition and mechanical stability of *Hevea latex* is reviewed and the results of analyses carried out on a number of clones are presented and discussed. Latices from the best clones tended to have a high PO₄/Mg ratio but clonal differences were generally obscured by variations due to environment. A very low PO₄/Mg ratio was invariably associated with low mechanical stability of the latex concentrate, but the reverse was not always true.

- 623 **HILTON, R. N.**
South American leaf blight. A review of the literature relating to its depredations in South America, its threat to the Far East, and the methods available for its control.
J. Rubb. Res. Inst. Malaya 1955 : 14 : 287-337.

ALTSON, R. A.

Memorandum. South American leaf disease of rubber.

Ibid. 1955 : 14 : 338-54.

The section dealing with measures undertaken to control *Dothidella ulei* in the Americas includes a short account of breeding for resistance. Legislative steps taken to exclude the disease from Asia and eradication measures planned in the event of any outbreak are described. Breeding in the East has been handicapped by the embargo imposed by American countries upon export of *Dothidella*-resistant material. In 1949 information was however received that the Brazilian Government was not a signatory to the agreement. Arrangements were then made for the introduction of resistant clones from Brazil into Malaya, in exchange for RRI clones, and for the provision of intermediate quarantine at the station of the US Department of Agriculture at Coconut Grove, Fla., instead of at Kew, England. In December 1954, the first resistant introductions were made available for distribution to other organizations in the East. The work of testing Malayan selections for resistance has been assigned to a special substation in Trinidad.

- 624 **PAARDEKOOPER, E. C.**
Eerste resultaten van de meeldauwresistentie-selectie bij hevea. (**First results of selection for mildew resistance in rubber**).

Bergcultures 1955 : 24 : 319-23.

Pedigree selection of clone LCB870 and of illegitimate seedlings of this clone has been undertaken at the CPV Experiment Station, Bogor, with a view to obtaining mother trees combining resistance to leaf mildew with the innate high-yielding capacity of LCB870. A number of promising trees have so far been obtained. A close correlation was established between reaction to mildew and overwintering behaviour. No evidence was obtained in support of the hypothesis that there is a correlation between resistance and rate of cuticle deposition (cf. *PBA*, Vol. XXV, Abst. 3344). In addition to the above selection programme, the results of

trials of different clones and hybrids for resistance to mildew are reported.

FRUITS AND NUTS

625 SLATE, G. L.

Minor fruits.

Nat. hort. Mag. 1955 : 34 : 139-49.

Brief descriptions, together with notes on improved varieties, are given for the following: *Diospyros virginiana*, *Asimina triloba*, *Actinidia* spp., *Amelanchier alnifolia*, *Sambucus* spp., *Viburnum trilobum*, *Shepherdia argentea*, *Prunus* spp., *Morus* spp., *Chaenomeles lagenaria*, medlar, *Elaeagnus multiflora* and *Ribes odoratum*.

626 BROOKS, R. M. & OLMO, H. P.

Register of new fruit and nut varieties. List 9.

Proc. Amer. Soc. hort. Sci. 1954 : 64 : 535-49.

Notes are given on the origin and main features of varieties of fruits and nuts recently introduced in the USA.

Annual Report of the East Malling Research Station, near Maidstone, Kent, 1st October, 1953 to 30th September, 1954 (1955) : Pp. 170.

627 Rogers, W. S. *Pomology*. (pp. 20-27).

A few seeds have been obtained as a result of an attempt to produce dwarfing rootstocks for cherries by crossing four East Malling cherry rootstocks with *Prunus wadai*, *P. pumila* and Morello.

The pear x quince hybrid, *Pyronia veitchii* var. *luxemburgiana*, has been back-crossed to pear in an attempt to produce improved rootstocks for pears.

Numerous seedlings have been obtained from crosses between various apple rootstocks. Seedlings from crosses of Cox's Orange Pippin with some late-flowering varieties have been selected for mildew resistance. Seeds have been obtained from reciprocal crosses between apple and pear. The possibility of breeding raspberries for autumn fruiting is being investigated. Two F_2 families of *Rubus occidentalis* x *R. idaeus* are segregating for thorniness, fruit colour, petiole length and fertility. Plants with promising fruit characters have been selected from Boysenberry x Exploit. Lloyd George x *Rubus palmatus* hybrids varied in vigour but were mostly sterile.

Colchicine treatment appears to have improved the fertility of the nearly spineless hybrids from the cross black currant ♀ x gooseberry ♂, but was without effect on black currant x *Ribes*

longeracemosum. Hybrids between semispineless Canadian gooseberries and Lancashire Lad were all spiny.

628 Harris R. V. *Plant pathology*. (pp. 34-37).

Breeding and testing of wilt-resistant hop seedlings continued (cf. *PBA*, Vol. XXV, Abst. 474).

629 Massee, A. M. *Entomology*. (pp. 38-40). Seedlings from crosses of Cox's Orange Pippin with Northern Spy x Laxton's Superb, Northern Spy x Winter Majetin and Northern Spy x Malling I have continued to show resistance to woolly aphid. Further resistant seedlings have been obtained from Northern Spy x Ben Nevis and from open-pollinated Northern Spy x Laxton's Superb.

630 Tydeman, H. M. *Descriptions of the Malling apple rootstocks*. (p. 64).

Descriptions and illustrations are given of the rootstocks MI-MXVI, MXVIII-XXIV and Crab C.

631 Preston, A. P. *A black currant variety trial*. (pp. 78-81).

Details are given of the flowering characteristics, percentage fruit set, incidence of disease, time of ripening and yield of seven varieties tested over seven years at East Malling. Wellington XXX gave the heaviest total yield.

632 Way, D. W. & Freeman, G. H. *Preliminary tasting trials with strawberries and raspberries*. (pp. 96-98).

A technique for assessing palatability is described and the results of tests of nine strawberry and 16 raspberry varieties are given.

633 Legg, J. T. *The spread of nettlehead disease and its association with split leaf blotch virus in certain hop varieties*. (pp. 128-32).

Clones of Fuggle and of six new varieties differed in susceptibility to nettlehead. The differences may be due to genetic factors and to an initial infection of some plants with split leaf blotch virus, a possible component of a complex causing nettlehead.

634 RODIONOV, A. P. **(Breeding research on fruit trees and soft fruits in the Ukraine).**

Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 4 : 3-13. [Russian].

Mention is made of new selections from the Ukraine, notably apples combining good quality of fruit and hardness, hardy apricots, large-fruited early sweet cherries, peaches distinguished by earliness and tolerance of low

temperatures, and strawberries that are exceptionally early or produce fruits twice the size of the older varieties.

635 Progress Report of the Summerland, B.C. Experimental Station, 1949-1953 (1955) : Pp. 47.

In addition to the work described below, it is reported that varietal trials of fruits and vegetables have been conducted and that numerous hybrid seedlings of apple and cherry are under observation. Details are given of the hardiness of numerous fruit varieties.

Apricot. Introduced varieties and a number of hardy seedlings discovered in the cold winter of 1949-50 are being used as parents.

Onion. The development of hybrids suited to Okanagan conditions is in progress; so far, Hybrids 1, 5 and 6 show promise.

Tomato. Breeding objectives include the development of locally adapted F_2 [*sic*] hybrids with resistance to *Verticillium* wilt.

636 VASILJEVA, V. N. (Mičurin's apple varieties in Siberia). Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 19 : 126-27. [Russian].

Mention is made of breeding work at Novosibirsk where Mičurin varieties have been crossed with hardy local forms such as Ranetka Purpurnaja [Purple Reinette].

637 DAVIS, M. B., BLAIR, D. S. & SPANGELO, L. P. S. Apple breeding at the Central Experimental Farm, Ottawa, Canada, 1920-1951. Proc. Amer. Soc. hort. Sci. 1954 : 63 : 243-50.

Analysis of the results of breeding at the above station provides the following information on the value of varieties as parents. In descending order of desirability, Delicious, Duchess, Yellow Transparent, McIntosh, Wealthy, Melba, Fameuse and Crimson Beauty have proved to be useful in breeding for fruit size, the best combination in this respect being Wealthy x Delicious. When two varieties with a high percentage of red colour are crossed a highly satisfactory mean for this character is obtained. A large percentage of Delicious hybrids have possessed greenish flesh; Wealthy x Fameuse seedlings were predominantly white-fleshed. With respect to quality, Delicious has in general been a disappointing parent; Cox's Orange, McIntosh, Wealthy and Melba appear to be

valuable parents in this respect. Crimson Beauty has shown the best combining ability for tree hardiness, followed by Duchess and McIntosh. Within certain progenies the trees ranged from being semivigorous to extremely vigorous. In breeding for earliness, the crosses of Melba with Crimson Beauty and Astrachan, and for late keeping McIntosh x Sandow, McIntosh x Milwaukee, Sandow x Cortland, Linda x Lawfam and Linda x Delicious offer promise.

638 KRAVČENKO, L. M. (The effect of the pollinating variety upon the formation of fruit characters). Agrobiologija (Agrobiology) 1955 : No. 2 : 115-17. [Russian].

Directed changes were obtained in a young apple hybrid which was fertilized with the pollen of old established varieties. Some branches of the hybrid were open-pollinated each year; others were pollinated by the same variety each year. Data on the effects of the pollinator upon the set, yield, weight, shape, colour and chemical properties of the fruits on different branches of the same tree are presented. The effects of the pollinator upon maturation and keeping properties of the fruit were also noticed.

639 ČERNENKO, S. F. & ČERNENKO, E. S. (Methods of producing hybrids between apple and pear). Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 4 : 14-32. [Russian].

An account of wide crossing at Mičurinsk, dealing mainly with the methods employed to improve crossability, is presented. It includes general descriptions of the morphological characteristics of hybrids from direct and reciprocal crosses and notes on varied effects of training upon different stocks. Mention is made of a hybrid of pear x apple that bore pear fruits weighing up to 80 g.; it was interesting for late maturation and good keeping properties, but the fruits had indifferent flavour. Some of the F_1 plants are being used for back-crossing with dessert varieties of apple or pear.

640 BISHOP, C. J. & AALDERS, L. E. A comparison of the morphological effects of thermal neutron and X irradiation of apple scions. Amer. J. Bot. 1955 : 42 : 618-23.

On comparing the effects of X irradiation with those caused by thermal neutrons, it was found that, at dosages resulting in equal inhibition of shoot growth in scions of the apple Cortland,

thermal neutrons produced about twice as many shoot bifurcations as the X rays. While inhibition of growth is regarded as an indication of total damage due to irradiation, shoot bifurcations are considered to be the result of induced chromosomal changes; it is therefore suggested that thermal neutrons may be more effective than X rays as a mutagenic agent for producing bud sports in apples.

641 KLEIN, L. G.

Promising new Delicious color sports.

Fruit Var. hort. Dig. 1955 : 10 : p. 8.

Short descriptive notes are given on the sports Red Delicious, Royal Red, Red King, Earlired and Chelan Red which are under trial at the New York State Agricultural Experiment Station. They originated from Delicious or its sports Richared and Starking.

642 TUKEY, L. D. & WHITE, D. G.

The evaluation of apple color sports.

Fruit Var. hort. Dig. 1955 : 10 : 13-14.

Sports of Rome Beauty, Stayman and Delicious are being tested at the Pennsylvania Agricultural Experiment Station. Colour and storage trials were carried out on four sports of Rome Beauty. Gallia Beauty exhibited the greatest intensity of red colour; the fruits of all four sports stored equally well at 32-35° F. but at 45° F. a storage disorder appeared, susceptibility to which was related to intensity of red colour.

643 SCHANDER, H.

Über die Ursachen von Gewichtsunterschieden bei Samen von Kernobst (Apfel und Birne). [**On the causes of differences in weight in the seeds of pome fruits (apple and pear)**].

Z. Pflanzenz. 1955 : 34 : 255-306.

The relationship between seed size on the one hand and fruit size and number of seeds per fruit on the other was investigated in a wide range of apple and pear varieties with a view to obtaining information on factors affecting germinability and seedling vigour. A positive correlation usually existed between fruit size and the size and number of seeds in the fruit. The position of the individual fruit in the cluster, the position of the cluster on the tree and the number of fruits per cluster also exercised a minor influence upon the size of the seed. A negative correlation was found between number of seeds per fruit and seed size in apples or pears containing a large number of seeds. Conversely, in fruits with an abnormally low number of seeds, seed size increased with seed number,

presumably because a minimum number of seeds must be present to ensure that the necessary nutrients are extracted from the sap in sufficient quantities for adequate seed growth. Germinability and seedling vigour were closely related to seed size. Plates and tabulated data are provided to illustrate varietal differences in seed shape and size and the influence of competition among seeds on these two characteristics is discussed.

644 HOTZ, E. & LÜTHI, H.

Bericht über die Prüfung sortenreiner Apfel- und Birnensäfte. (**Report on the testing of apple and pear juices from individual varieties**).

Schweiz. Z. Obst- u. Weinb. 1955 : 64 : 368-72.

Tabulated data are presented on the taste and sugar and acid contents of the juice of 15 apple and 11 pear varieties grown in Switzerland on a commercial scale. Grauer Hordapfel [Grey Prolific] and Leuenapfel [Lion's apple] of the apple varieties, and Spitzbirne [Pointed pear] and Theilersbirne of the pear varieties, were adjudged to be the most suitable for the extraction of high-quality juice.

645 DAYTON, D. F.

Breeding scab-resistant apples.

Trans. Ill. hort. Soc. 1954 : 88 : 122-25.

In the cooperative apple-breeding programme of the Illinois, Indiana and New Jersey Agricultural Experiment Stations, promising scab-resistant selections have been obtained by back-crossing F_1 hybrids between resistant forms of several *Malus* species and susceptible commercial varieties. The resistance of *M. floribunda* '821' depends upon a single dominant gene, a single dose of which confers resistance upon both $2n$ and $3n$ seedlings. The resistance of *M. pumila* 'R12740-7A' is determined by at least two major genes. Some of the species transmit factors for very early bearing. BC_2 and BC_3 seedlings from the various crosses are now under test in several states; it is expected that some of them will be of commercial promise since the fruits of a number of back-cross seedlings from which they were derived approached commercial standards in size, quality and appearance, in spite of the small fruit size of their resistant progenitors.

646 Z., L.

Mirakosa, nuova varietà di susina. (**Mirakosa, a new plum variety**).

Ital. agric. 1955 : 92 : p. 440.

The variety described is said to be a hybrid of

Nancy Mirabelle x Victoria, produced by M. Etscheid at Prangenberg in Austria.

- 647 WELKERLING, E. M. L.
Problemas de autoincompatibilidad sexual en variedades de almendro y damasco. (**Problems of sexual self incompatibility in varieties of almond and damson**).
Idia 1955 : No. 85 : 1-2.

Observations made at Mendoza, Argentina, on 12 varieties of almond and 18 of damson showed all the almonds to be self incompatible and all the damsons except Damasca to be self compatible.

- 648 VITANOV, M.
(**A study of red leaf spot of plum and methods of combating it**).
Spis. nauč.-izsled Inst. Minist. Zemed., Sofia 1953 : 20 : No. 3 : 145-74. [Bulgarian].

Varietal differences in resistance to the disease caused by *Polystigma rubrum* are noted. Varieties showing a fair degree of resistance are of indifferent quality but it is thought that they may have value in breeding for resistance.

- 649 STEYN, P. A. L.
The Culemborg, Van Riebeeck and Swellengrebel South African - bred dessert peach varieties.

Fmg. in S. Afr. 1955 : 30 : 313-17, 326.

The characteristics of the above three peaches, all white-fleshed, freestone derivatives of Bablock x Early Dawn, are described in detail (cf. *PBA*, Vol. XXIII, Abst. 1797 and Vol. XXIV, Abst. 1731). Culemborg ripens at approximately the same time as Early Dawn. Swellengrebel matures somewhat later, followed by Van Riebeeck. All three varieties have resistance to delayed defoliation and good storage quality.

- 650 JOHNSTON, S.
Sunhaven and Richhaven—new peach varieties.

Quart. Bull. Mich. agric. Exp. Sta. 1955 : 37 : 461-63.

Sunhaven [Redhaven x SH50 (J. H. Hale x Halehaven)] is chiefly valuable as a very early-maturing peach for the fresh market, ripening 40 days earlier than Elberta; its stone is only free when the fruit is fully ripe. The freestone variety Richhaven, from the same cross, bears larger, brighter coloured and firmer fruits than Halehaven and is suitable for canning. Ripening about a fortnight before Elberta, it has the same season of maturity as Halehaven.

- 651 MOWRY, J. B.
Peach breeding and grape testing in 1954 at the Illinois Horticultural Experiment Station.
Trans. Ill. hort. Soc. 1954 : 88 : 202-07.

A brief progress report is given on the performance of eight peach selections (Ill. 1 to Ill. 8) in a second-test orchard; most of the seedlings ripen earlier than Elberta. So far the results of trials on varieties and selections suggest that Seneca, Xlna and NY12997 are promising as early maturing grapes for southern Illinois.

- 652 McCARTY, C. D. & LESLEY, J. W.
The carotenoids, amygdalin content, and titratable acidity of white- and yellow-fleshed peaches within a nearly isogenic line.
Proc. Amer. Soc. hort. Sci. 1954 : 64 : 289-92.

Investigations on F_5 trees apparently isogenic except for genes for fruit colour indicated that the dominant wild-type allele w^+ for white flesh is active in forming small amounts of β carotene and of at least two unidentified pigments, whereas the allele w for yellow flesh determines the production of α carotene, cryptoxanthin, isolutein and zeaxanthin and a greater amount of β carotene. Peaches with yellow and white flesh had similar contents of amygdalin in the kernels and of titratable acid (expressed as citric acid).

- 653 SOOST, R. K. & CAMERON, J. W.
Production of hybrids by the use of stored trifoliolate orange pollen.
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 234-38.

Using pollen of *Poncirus trifoliata* which had been stored at 4° C. over CaCl_2 , hybrid seedlings were obtained from crosses with the mandarin Clementine, orange Ruby and other citrus fruits at the Citrus Experiment Station, Riverside, Calif. Viable seeds were not secured by crossing with pollen stored longer than 36 days. The breeding problem raised by the early blooming habit of *P. trifoliata* can thus be surmounted.

- 654 SOOST, R. K.
Bud variation in citrus.
Fruit Var. hort. Dig. 1955 : 10 : 9-12.

The significance of bud variation in the origin of new varieties and as a problem in propagation is discussed, mainly with reference to the citrus industry in California.

- 655 HOWES, F. N.
History and development of the cultivated fruits (Pt. VII).
 Rev. Ass. Agric., Lond. 1955 : No. 28 : 15-27.

This account of the cultivation and origins of the tangerine, grapefruit, orange, sweet orange, lemon, lime, shaddock, citron and kumquat continues a series of articles on cultivated fruits commonly grown in Europe and America (cf. *PBA*, Vol. XXV, Abst. 3400).

- 656 SERAFIMOV, S. S.
(Fruiting of citrus seedlings at an early age).
 Agrobiologija (Agrobiology) 1955 : No. 2 : 83-87. [Russian].

The first flower of an 8-months' old seedling of Duncan grapefruit was fertilized by mixed pollen from two flowers of Meyer's lemon and provided the pollen for the two reciprocal crosses. All three fruits set showed normal development and contained about 20 seeds each upon reaching maturity. The inability of the young plant to provide itself an adequate amount of nourishment in the case of the grapefruit ♀ x lemon ♂ hybrid was overcome by grafting it first upon a vigorous lemon and then upon a vigorous *Poncirus trifoliata* stock. The first seed generation of the last mentioned hybrid resembled a grapefruit in habit. The progeny of the reciprocal hybrids showed variability in leaf shape; the leaves of some plants resembled those of Meyer's lemon, others those of grapefruit or orange. A plant in each progeny was tolerant of -12.6° C.

- 657 CONDIT, I. J.
Fig varieties: a monograph.
 Hilgardia 1955 : 23 : 323-538.

Descriptions of varieties of caprifig, Smyrna, San Pedro and common types are presented. The monograph is chiefly based upon observations made in California, but also on notes taken during visits to France, Algeria and several other countries.

Proceedings of the Ninth Annual Research Conference of the California Fig Institute, Fresno, California 1955 : Pp. 46. (Mimeographed).

- 658 Storey, W. B. *Sex inheritance in figs.* (pp. 15-17).

Data obtained at the Citrus Experiment Station, Riverside, Calif., suggest that flower types in *Ficus carica* are determined by two pairs of genes, Gg^L and Aa , short-styled flowers, long-styled flowers, staminate flowers and absence of

staminate flowers depending on G , g^L , A and a respectively. Caprifigs maintained for pollination have the genotype Gg^LAa , that of the fig being g^Lg^La .

- 659 Warner, R. M. *Processing characteristics of new fig varieties and seedlings.* (pp. 17-19).

Notes are given on the qualities of seedlings of the common and Smyrna types developed in California.

- 660 TREVISAN, M.
 Studio morfologico sulle foglie di *Morus alba* L. di alcune varietà giapponesi, cinesi ed italiane. (Morphological study on the leaves of some Japanese, Chinese and Italian varieties of *M. alba* L.).

Agricoltura d. Venezie 1955 : 9 : 423-30.
 Biometrical studies on the leaves of a series of Italian and introduced Far Eastern varieties are reported; data are also given on loss of weight of the leaves after plucking. The leaves of the Japanese varieties Akagi and Komaki were the only ones comparable in size and thickness with those of the Italian variety Florio.

- 661 ORR, K. J. & MILLER, C. D.
Description and quality of some mango varieties grown in Hawaii and their suitability for freezing.
 Tech. Bull. Hawaii agric. Exp. Sta. 1955 : No. 26 : Pp. 24.

Information is given on the fruit qualities of 21 varieties.

- 662 KARAEV, I. G.
(Valuable forms of the walnut).
 Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 9 : 55-57. [Russian].

Recent selections from the Tadžik Horticultural Institute produce high quality nuts with an oil content of up to 73%. Some are hardy and show resistance to insects.

- 663 KESTER, D. E. & JONES, R. W.
Small-nut almonds: progress in development of varieties consistently producing small sized nuts.
 Calif. Agric. 1955 : 9 : No. 8 : p. 6.

Promising selections are under observation in California for their suitability as a source of small kernels for use in candy-bar manufacture.

- 664 VENKATANARAYANA, G.
Groundnut in Madras and its economic importance.
 Madras agric. J. 1952 : 39 : 355-82.

This introduction to the cultivation of groundnuts in Madras province includes a note on the

classification and economic importance of the more important varieties and forms grown in this region (cf. *PBA*, Vol. XXV, Abst. 2352). At the Tindivanam Agricultural Research Station, an extensive breeding programme is being carried out to improve, *inter alia*, the eating quality of the more productive varieties and their suitability for forage purposes, to impart a white seed-coat to the high-yielding strains already evolved and to increase the shelling out-turn of AH25 (TMV1). Mass and pedigree selection of Gudiyatham Bunch and Saloom has resulted in highly productive lines superior in most respects to the local standards. Saloom has also displayed a high degree of drought resistance. Hybrid AH6481, a selection from the cross Gudiyatham Bunch x Native Tanganyika, appears particularly promising, combining bunch habit and high yields and producing seeds with a marked dormant period.

- 665 KRAPOVICKAS, A. & RIGONI, V. A.
Estudios citológicos en el género *Arachis*.
(Cytological studies in the genus *Arachis*).
Rev. Invest. agríc. B. Aires 1951 : 5 : 289-93.

The studies reported show that $2n = 40$ in *A. pusilla* and $2n = 20$ in *A. villosa* vars. *typica* and *correntina*. A certain number of polysomatic cells with $2n = 80$ were observed in *A. pusilla*.

Fertile seeds were obtained in crosses of *A. villosa* var. *correntina* x *A. hypogaea*, giving rise to F_1 hybrids in which the procumbent and perennial habits of *A. villosa* were dominant. The hybrids, which flowered profusely but produced no seeds, had 30 somatic chromosomes and a number of univalents were observed at meiosis in the pollen mother cells.

- 666 DAVIS, T. A., ANANDAN, A. P. & MENON, K. P. V.
Hermaphroditism in *Cocos nucifera* L.
Indian Cocon. J. 1954 : 7 : 133-41.

The occurrence of four trees at the Central Coconut Research Station, Kyangylam, India, each bearing spikes with male, female and hermaphrodite flowers, is reported. The hermaphrodite flowers are smaller than the female flowers and produce smaller fruits.

- 667 NARAYANA, G. V.
A gigas form of the coconut (*Cocos nucifera* Linn., var. *typica* Nar. f. *gigantea*).
Madras agric. J. 1952 : 39 : 388-90.

A comprehensive description of the morphological characters of the tree and fruit of the

above gigas form of coconut is given. In volume and weight of the husked and unhusked nut, quantity of milk and copra content it is superior to *C. nucifera* var. *typica*. A cytological examination showed that $2n = 32$, the same as in *C. nucifera* var. *typica*, so that the possibility of polyploidy must be excluded. The gigas form is not considered to be of economic importance as the number of female flowers produced, fruit set, nut yield, percentage of oil produced and copra quality are all inferior to those of *C. nucifera* var. *typica*. However, as it possesses a high degree of resistance to diseases and insect pests it may be valuable as breeding material in crosses with *C. nucifera* var. *typica*.

- 668 SCARAMUZZI, F. & CANCELLIERI, M. B.
Contributo allo studio delle razze d'olivo coltivate in Toscana. Indagini condotte in provincia di Livorno e nella media valle del Cecina. Parte II. (**Research on the varieties of olive cultivated in Tuscany. Investigations in the province of Livorno and in the central valley of the Cecina. II.**)
Ann. Sper. agr. 1955 : 9 : No. 4 : Suppl. : cxix-cxlv.

In the second part of this study (cf. *PBA*, Vol. XXV, Abst. 3393), full descriptions are given of nine of the principal varieties of the area, taking into consideration characters of the leaf, fruit and kernel, floral characters, including self and cross compatibility, yield and quality of oil, resistance to pests and to wind, area of distribution and possible synonyms.

- 669 ORTEGA NIETO, J. M.
Las variedades de olivo cultivadas en España. (**The olive varieties cultivated in Spain**).
Minist. agric. Inst. Invest. agron., Madr. 1955 : Pp. 75.

Detailed biometrical descriptions, illustrations and notes on distribution and agronomic characteristics are given for 24 Spanish varieties.

- 670 BÒTTARI, V.
Ricerche sulla biologia florale delle cultivar d'olivo nella Sicilia occidentale. (**Research on the floral biology of olive cultivars in western Sicily**).
Ann. Sper. agr. 1955 : 9 : 883-99.

Further data (cf. *PBA*, Vol. XXIV, Abst. 618) are given on dates of flowering, pollen production, general characteristics and synonymy of the olive cultivars of western Sicily. The results of selfing and interpollinations show that the popular variety Cerasuola is male sterile; all others are self incompatible and the most

suitable varietal combinations for interpollination are indicated.

- 671 WARMKE, H. E., CABANILLAS, E. & CRUZADO, H. J.

A new interspecific hybrid in the genus *Carica*.

Proc. Amer. Soc. hort. Sci. 1954 : 64 : 284-88.

C. goudotiana has been crossed as female with *C. monoica* at the Federal Experiment Station, Mayagüez, Puerto Rico. The highly fertile F_1 hybrids were intermediate in most vegetative features but resembled the ♂ parent in being monocious. The 144 F_2 plants obtained segregated widely for vegetative characters and sex type.

- 672 BRINGHURST, R. S.

Interspecific hybridization in and chromosome numbers in *Persea*.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 239-42.

Hybrid seedlings have been produced at the University of California, Davis, by crossing *P. americana* ♀ with *P. floccosa* ♂, but whether the seedlings obtained from *P. americana* ♀ x *P. nubigena* ♂ are hybrids is uncertain. Attempts to cross *P. americana* with *P. borbonia* resulted in the set of two fruits from over 1700 pollinations, neither fruit being known to be of hybrid origin. *P. borbonia*, *P. floccosa*, *P. nubigena* and *P. longipes* resembled *P. americana* in having $2n = 24$.

- 673 MORROW, E. B., DARROW, G. M. & SCOTT, D. H.

A quick method of cleaning berry seed for breeders.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : p. 265.

At the Plant Industry Station, Beltsville, Md., seed of blackberry, strawberry and several other berry fruits has been successfully cleaned by placing the fresh berries in a Waring Blendor, covering them with water and allowing the electric current to run for 15-45 seconds. The pulp is decanted after the sound seed has settled; when thoroughly washed the seed is filtered off and allowed to dry.

- 674 Cane fruits.

Bull. Minist. Agric., Lond. 1955 : No. 156 : Pp. 29.

Brief descriptions of raspberry, blackberry and loganberry varieties suitable for cultivation in England are given, together with notes on the various diseases to which they are susceptible.

- 675 PRATT, C. & EINSET, J.

Development of the embryo sac in some American blackberries.

Amer. J. Bot. 1955 : 42 : 637-45.

The development of the embryo sac was studied in *Rubus allegheniensis* (3x), *R. localis* (3x), *R. bellobatus* (4x), *R. abactus* (5x), *R. meracius* (7x) and *R. flagellaris* (9x). In the diploid, which reproduced sexually, a reduced embryo sac was formed, while in the polyploids, which were facultatively pseudogamous, the embryo sacs were aposporous. The ovules of the polyploids often contained more than one embryo sac each but frequently failed to produce any mature embryo sacs, this failure being less marked in the tetraploid than in the other polyploids.

- 676 HYLANDER, H.

Rubus plicatus, dess formkrets och närstående arter. (***R. plicatus*, its Formenkreis and related species**).

Bot. Notiser 1955 : 108 : 341-80.

A taxonomic survey is given of Scandinavian and other European varieties and forms of *R. plicatus*, some allied species and its hybrids with *R. caesius*, *R. sulcatus* and *R. idaeus*.

- 677 WOOD, C. A.

Raspberry variety trials and cultural experiments.

Bull. Edinb. Coll. Agric. 1954 : No. 47 : 17-23.

Work on breeding, testing and cultivation at Scottish stations is outlined (cf. *PBA*, Vol. XXV, Absts. 2363 and 3401).

- 678 SLATE, G. L. & KLEIN, L. G.

A second report on the breeding of purple raspberries.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 262-64.

The results of crossing black with red raspberries to produce purple types at the New York State Agricultural Experiment Station are described. Only Bristol x NY17861 (Newburgh x Indian Summer) and Cumberland x Newburgh produced desirable seedlings.

- 679 EINSET, J. & PRATT, C.

Hybrids between blackberries and red raspberries.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 257-61.

Hybridization of $2n$ and $4n$ varieties of red raspberries with $2n$ and $4n$ varieties and wild clones of blackberries at the New York State Agricultural Experiment Station is described. Some combinations were productive of vigorous seedlings, particularly crosses of the types $2n$ red raspberry x $4n$ blackberry and $4n$ red raspberry

x 4n blackberry. No vigorous seedlings were obtained from crosses in which blackberries were females. Tetraploid hybrids have borne good crops of fruit and may be of use in breeding. Triploid hybrids were highly sterile:

680 DARROW, G. M.

Blackberry-raspberry hybrids.

J. Hered. 1955 : 46 : 67-71.

Of 49 seedlings from crosses between the diploid blackberry Early Harvest (♀) and various diploid red raspberries (♂), most were vigorous and produced few or no suckers; 29 showed varying degrees of male sterility; 38 were free from diseases; but only two were fertile, the berries being small and highly flavoured but not readily separable from stem or receptacle. The fruits of seven moderately vigorous and fertile hybrids between tetraploid raspberries (♀) and tetraploid blackberries (♂) were similarly not easy to pick. It is considered that hybrids with an uneven balance of blackberry and raspberry chromosome sets are more likely to have easily separable fruits than those with balanced sets.

681 DARROW, G. M.

Nature of thornless blackberry sports.

Fruit Var. hort. Dig. 1955 : 10 : 14-15.

The occurrence of thornless sports in the USA is briefly surveyed and their possible origin discussed. The thornless forms of Evergreen, Cory, Young and Logan are apparently chimeras with a thornless epidermis surrounding genetically thorny layers.

682 EVREINOFF, V.-A.

Le cassis. Notes pomologiques. (The black currant. Pomological notes).

Rev. hort., Paris 1955 : 127 : 1266-67.

Data are presented on the morphology of the leaves, clusters and fruits of the different botanical varieties and cultivated forms.

683 KUMINOV, E. P.

(A new gooseberry variety in Siberia).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 9 : 76-77. [Russian].

Pervnec [First-born] bred at Minusinsk from Mestnyi Altaiskii [Local Altai] x Zelenyi Butylochnyi [Green Bottle] is distinguished by high yield, hardiness and resistance to *Sphaerotheca*.

684 RITCHIE, J. C.

A natural hybrid in *Vaccinium*. II. Genetic studies in *Vaccinium intermedium* Ruthe.

New Phytol. 1955 : 54 : 320-35.

Breeding experiments have confirmed that the

parentage of *V. intermedium* is *V. myrtillus* x *V. vitis-idaea* (cf. PBA, Vol. XXV, Abst. 2366). Progeny from the backcross *V. intermedium* ♀ x *V. vitis-idaea* ♂ showed introgression to the recurrent parent, but natural populations of *V. intermedium* and of the parental species in the British Isles were remarkably homogeneous. The lack of natural introgression is ascribed to the partial sterility of the F₁ hybrid, effective asexual reproduction, the high frequency of inbreeding and the isolation of populations by ecological, phenological and biological factors.

685 DARROW, G. M., SCOTT, D. H. & DERMEN, H.

Tetraploid blueberries from hexaploid x diploid species crosses.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 266-70.

Selections early in season and with fruit of commercial size have been developed at the Plant Industry Station, Beltsville, Md., by first crossing rabbit-eye varieties [*Vaccinium ashei* (6n)] with the diploid species *V. tenellum* and then crossing the 4n hybrids so obtained with high-bush blueberry [*V. australe* (4n)]; early-maturing varieties are required for growing in the southern region of the USA. *V. ashei* has also been crossed with the 2n species *V. atrococcum*, *V. elliotii*, *V. darrowi* and *V. vacillans* with a view to incorporating the drought resistance and other valuable features of these wild species into commercial blueberries.

686 MEADER, E. M., SMITH, W. W. & YEAGER, A. F.

Bush types and fruit colors in hybrids of high-bush and low-bush blueberries.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 272-78.

Selections of the low-bush species *Vaccinium lamarckii* were crossed with the high-bush blueberries *V. corymbosum* 'Pemberton' and 'Atlantic' at the New Hampshire Agricultural Experiment Station. In 1953 data were obtained on 7 eleven-year-old F₁ plants and 954 four-year-old F₂ bushes obtained presumably as the result of sibbing. Height in the F₁ was intermediate and in the F₂ showed considerable segregation. Difficulties in grading blueberries for fruit colour are discussed. Fruits of the F₁ were all dark, two colour classes being distinguished. Fruits of the F₂ were grouped in nine colour classes, but only two out of the 743 bushes examined were of the desirable "aluminium" type with black skin and thick persistent bloom. Some F₂ individuals were stoloniferous. Larger populations are required if the hope of obtaining a

combination of intermediate height, stoloniferous habit and berries of the aluminium type is to be realized. Faster progress may be achieved by interbreeding promising F_2 individuals; F_1 Pemberton \times low-bush hybrids have accordingly been crossed with strongly stoloniferous selections of *V. constablei* bearing berries of the aluminium class in an attempt to develop suitable material for interbreeding.

- 687 REID, R. D. & WOOD, C. A.
Talisman: a report by its raisers.
 Grower 1955 : 44 : 669-73.

The strawberry Talisman (an unnamed seedling of American origin $\text{♀} \times \text{Climax} \text{♂}$), recently introduced by the Scottish Horticultural Research Institute, is discussed. Its season of ripening is practically the same as that of Climax. It bears large to medium fruits; preliminary reports of its suitability for jam, canning and quick freezing are favourable. In field resistance to red core it is considered equal to Climax.

- 688 Une nouvelle sorte de fraises "Holstein."
(A new strawberry variety, Holstein).
 Courr. hort. 1955 : 17 : p. 271.

Holstein, a new variety recently introduced from Germany, is described briefly. It produces good yields of medium-sized bright-red berries with a high sugar content and suitable for eating as dessert, for preserving or for jam-making. The outstanding characteristic of Holstein is its ability to fruit within one year from planting. It is recommended for cultivation in Belgium and does best on sandy soils with a high humus content.

- 689 BLOMMERS, J.
 Rassenproef bij aardbeien. (**Varietal trial of strawberries**).
 Fruitteelt 1955 : 45 : p. 786.

In trials carried out at Dussen, Netherlands, in 1954, Ydun gave a considerably higher yield than any of the other eight varieties tested.

- 690 LEMAÎTRE, R. & SIRONVAL, C.
 Nouvel essai de production de fraises en hiver dans les conditions de la pratique.
(A new attempt at producing strawberries in winter under practical conditions).

Bull. Hort., Liège 1955 : 10 : 284-89.

Experiments at the Laboratory of Plant Physiology, Liège University, showed that it was possible to produce strawberries under glass in December by carefully regulating the amount

of supplementary artificial light the plants received. Triomphe de Tihange [Tihange Triumph], Deutsch Evern and Surprise des Halles [Surprise of the Market] proved the most suitable varieties for this purpose; they grew vigorously and produced good crops in time for Christmas.

- 691 POWERS, L.
Inheritance of period of blooming in progenies of strawberries.
 Proc. Amer. Soc. hort. Sci. 1954 : 64 : 293-98.

The inheritance of the everbearing *vs.* noneverbearing habit was studied by selfing and crossing in all possible combinations the variety Montana and nine derivatives of cultivated varieties (*Fragaria ananassa*) \times *F. ovalis* (cf. PBA, Vol. XV, Abst. 1154). Dominant genes at three loci are reported to be involved in the control of this character, *viz.* A' or A at locus a , and B and C at the second and third loci respectively. The epistatic relationships of the genes were as follows $A' > A > B$ and C . The effects of the genes were cumulative, $AaBbCc$, $AaBbcc$ and $AabbCc$ plants, for example, being everbearing, and $Aabbcc$, $aaBbCc$ and $aaBbcc$ and $aabbCc$ individuals being noneverbearing. In addition, minor recessive genes may also have played a role in conditioning the period of blooming.

- 692 DARROW, G. M.
Leaf variegation in strawberry.
 Phytopathology 1955 : 45 : p. 464.
 (Abst.).

Leaf variegation has been found in the diploid species *Fragaria vesca*, in the hexaploid *F. moschata*, in the three octoploids *F. virginiana*, *F. chiloensis* and *F. ovalis* and in many horticultural varieties. Albinism occurs at the cotyledon stage in selfed variegated plants while in hybrid progenies chlorosis of the leaves appears at a later stage. Variegation is thought to be due to an unstable gene subject to frequent mutation. Variegated seedlings have been obtained by irradiating seeds of *F. vesca*. It is suggested that the occurrence of variegation may be controlled by the use of nonmutating varieties in breeding.

- 693 Discussiedag over ziekten en gezondheidselectie bij aardbeien. (**Discussion day on strawberry diseases and selection for freedom from disease**).
 Meded. Dir. Tuinb. 1955 : 18 : 449-79.

The proceedings of a meeting held at Wageningen, Netherlands, on 4 April 1955 to discuss

the control of virus diseases, eelworms and strawberry mites are reported. Mention is made of varietal differences in susceptibility to virus diseases and June yellows, and of the selection of resistant clones. Clones of Deutsch Evern, Climax and Jucunda with improved resistance to June yellows and viruses have been obtained.

- 694 WILHELM, S.
Verticillium wilt resistance.
Calif. Agric. 1955 : 9 : No. 9 : p. 9.

Techniques used in testing for resistance to *Verticillium* wilt in the strawberry at the University of California are outlined. Crosses of susceptible with resistant parents have usually yielded less than 20% resistant individuals; selfed resistant plants and crosses between resistant parents have given rise to under 50% resistant progeny. Approximately 95% of the highly wilt-resistant seedlings developed are also resistant to powdery mildew.

- 695 WILHELM, S.
Verticillium wilt of the strawberry with special reference to resistance.
Phytopathology 1955 : 45 : 387-91.

In researches carried out at the University of California the progenies of resistant x susceptible parents contained 8.3-20.8% plants with greater resistance than either parent, those of resistant x resistant parents 21.0-53% and those of susceptible x susceptible 0%. Resistance appears to be a dominant character controlled by multiple genes which are apparently closely linked with factors governing resistance to powdery mildew. Wilt resistance occurs in the varieties Marshall, Sierra and Blakemore and in certain North American clones of *Fragaria chiloensis*. It is suggested that resistance was introduced into cultivated varieties from the last-named source.

- 696 CARDEÑOSA-BARRIGA, R.
El género *Musa* en Colombia. Plátanos, bananos y afines. (**The genus *Musa* in Colombia. Plantains, bananas and related forms**).
Notas agron. Estac. agríc. exp. Palmira 1953 : 6 : 1-368.

An illustrated monographic account of the species and clones of section *Eumusa* occurring in Colombia is presented. A new species, *M. maoli*, represented in Colombia by the clone Pompo, is described.

- 697 COSMO, I., COMUZZI, A. & BORDIGNON, S.
Indagini sulla ricostituzione viticola delle Venezie ai fini dell'orientamento per i futuri impianti. Risultati della sperimentazione compiuta sui vitigni Europei da vino e sui portinnesti in provincia di Vicenza a decorrere dal 1925. Quarto contributo. Zona di pianura: sottozona del Brenta. Quinto contributo. Zona di pianura: sottozona meridionale. (**Investigations on the viticultural reconstruction of the Venetian provinces with the object of providing guidance for future planting. Results of experiments carried out on European wine grapes and on rootstocks in the province of Vicenza from 1925 onwards. 4. Zone of the plains: Brenta subzone. 5. Zone of the plains: southern subzone**).

Ann. Sper. agr. 1955 : 9 : 713-61.

In continuation of previous studies (cf. *PBA*, Vol. XXV, Abst. 540), results of observations are presented which show that in the Brenta subzone, where direct-producer hybrids are mainly grown, quite satisfactory results can be obtained with pure wine varieties such as Sangiovese and Merlot among the red or Trebbiano toscano and Riesling italico among the white sorts.

For the southern subzone Garganega and Riesling italico are recommended among the white and Raboso Veronese and Merlot or Tocai nero [Black Tokai] among the red.

Suggestions are made as to suitable rootstocks for each variety.

- 698 COSMO, I. & POLSINELLI, M.
"Raboso Veronese". (**Raboso Veronese**).
Ann. Sper. agr. 1955 : 9 : No. 4 : Suppl. : xci-cii.

A description of this vine is preceded by a discussion of its identity, of a number of possible synonyms and of its origin, which dates back to last century but is otherwise uncertain. A clone free from the occasional defect of producing green undersized grapes has been selected and the variety is extending in popularity in certain areas of northern Italy.

- 699 WILLIAMS, C. F.
Breeding perfect-flowered muscadine grapes.
Proc. Amer. Soc. hort. Sci. 1954 : 64 : 274-78.

An account is given of some of the results from crosses made in 1946 at the North Carolina Agricultural Experiment Station with the aim

of developing perfect-flowered varieties satisfactory in quality and plant characters. Tarheel and Topsail were the most promising parents as regards vigour. In breeding for resistance to black rot, Tarheel, Thomas and Latham have proved to be useful. The fruits of seedlings having Latham as one parent had the highest content of total soluble solids; seedlings with Duplin as one parent had the best fruit size. Seedlings with Tarheel as ♂ parent have been the most satisfactory with respect to bunch characters but have borne the smallest fruit.

700 CECUK, S.

Vitis silvestris est-il progéniteur de *V. vinifera*? (Is *V. silvestris* the ancestor of *V. vinifera*?)

Progr. agric. vitic. 1955 : 72 : 37-45.

The writer discusses the origin of Yugoslav varieties of the cultivated grape and arrives at the conclusion that *V. vinifera* is descended from *V. sylvestris*. It is further argued that the resistance of the Herzegovina *V. sylvestris* to phylloxera and fungous diseases is genetically identical with that possessed by the cultivated vine.

701 MITSUKURI, Y. & HAYASHI, M.
(Studies on triploid vines. I. Chromosome numbers of Japanese Vitaceae).

Senshokutai (Chromosome)/Kromosomo 1953 : Nos. 17-19 : 633-38. [Japanese].

Descriptions are given of the caryotypes of *Vitis vinifera* 'Koshu' and 'Daiana,' *V. labrusca* 'Concord' and 'Brighton' and *V. thunbergii* ($2n = 38$), *Ampelopsis heterophylla* ($2n = 40$) and *Cissus japonica* ($2n = 60$).

702 EINSET, J. & PRATT, C.

"Giant" sports of grapes.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 251-56.

Ten periclinal sports of the varieties Catawba, Concord, Fredonia and Hicks, consisting of a single outer $2n$ layer of cells and $4n$ inner tissue, are described. Four forms of Caregnane, Muscat of Alexandria, Niagara and Thompson Seedless, reputed to be tetraploids, also proved to be periclinal chimeras of the same type. Breeding with the sports of the first-mentioned group indicated that the chimeras behave as tetraploids.

703 LOOMIS, N. H., WILLIAMS, C. F. & MURPHY, M. M.

Inheritance of flower types in muscadine grapes.

Proc. Amer. Soc. hort. Sci. 1954 : 64 : 279-83.

Two types of hermaphrodites have been

distinguished, giving, on selfing, $3\text{♀} : 1\text{♂}$ plants and $9\text{♀} : 3\text{♀} : 4\text{♂}$ individuals respectively. Hermaphrodites of the first type were descendants of the ♀ mutant H^1 , those of the second type derivatives of another ♀ mutant, H^2 . *Vitis munsoniana* was involved in the parentage of H^1 ; H^2 was a seedling from pollination of Scuppernong by a staminate plant of *V. rotundifolia*. Pollination of representatives of the second group by the native staminate type Wallace resulted in a ratio of 1 pistillate : 3 staminate plants.

704 KIRCHHEIMER, F.

Über das Vorkommen der wilden Weinrebe in Niederösterreich und Mähren. (On the occurrence of the wild grape in Lower Austria and Moravia).

Z. Bot. 1955 : 43 : 279-307.

Studies on the past and present distribution of *Vitis sylvestris* in lower Austria and Moravia indicate that the range of this species is contracting rapidly, probably as the result of human intervention. Whereas a century ago the wild grape was found in an area covered by the triangle Göding-Klosterneuburg-Bratislava, it is now limited to the Danube basin between Vienna and Bratislava. The author compares the leaves, flowers and berries of *V. sylvestris* with those of the cultivated vine and concludes that the wild grape, which is also found in the valley of the Upper Rhine, is indigenous to Central Europe and is not a relict of Roman colonization.

FORESTRY

705 MUHAMMAD IHSAN-UR-RAHMAN KHAN
Forest tree breeding.

Z. Forstgen. Forstpflanzenz. 1955 : 4 : 21-25.

A cross section of the literature on forest-tree breeding is reviewed, special attention being paid to the selection of plus trees, the introduction of new species, interspecific hybridization and the role played by polyploidy in the natural evolution of forest-tree species.

706 Årsberättelse över Föreningens för växtförfädling av skogsträd verksamhet under år 1954. (Annual report on the work of the Association for Forest Tree Breeding during 1954).

Årsberätt. För. Växtf. Skogstr. 1954 : 3-18.

Ekebo Station

A trial of 20 progenies from crosses between pines from different southern Swedish stands

has been established. Tests of interspecific larch hybrids and of larches of various provenance are also in progress and progenies of *Pinus sylvestris* x *P. nigra* and *P. sylvestris* x *P. mugo* are under observation.

Interspecific spruce crosses and crosses between different continent spruces and between continent and Swedish spruces have been effected with a view to determining which combinations give the most rapidly growing progenies. *Picea abies* (♀) has been crossed with *P. mariana*, *P. omorica* and *P. asperata*. Selection of plus trees of pine and spruce continued.

Hybrids of *Populus tremuloides*, which is resistant to *Melampsora rustropii*, with *P. tremula* and *P. davidiana* have proved susceptible and slightly susceptible respectively to this pathogen; *P. tremula* x *P. davidiana* is highly susceptible. *P. tremula* x *P. tremuloides* is susceptible to *Valsa nivea*, although the former parent is apparently resistant.

Interspecific hybridization involving *Betula verrucosa*, *B. japonica* and *B. papyrifera* has been carried out. Seed resulting from crosses of *B. verrucosa* (♀) x *B. papyrifera* (♂) showed 6.3-42% germination, while that from the reciprocal crosses was only 0.1-4% viable.

Diploid and tetraploid hybrids have been obtained from crosses of *Alnus rubra* with diploid and tetraploid forms of *A. glutinosa*. Selection of plus trees of beech, ash, elm and alder continued.

Brunsborg Station

Picea glauca, *P. asperata*, *P. omorica*, *P. engelmannii*, *P. sitchensis* and *P. rubens* have been used as pollen parents in crosses with continent and Swedish spruces. Grafted pines have been used as mother plants in crosses with trees of various provenance.

Sundmo Station

Spruces from the province of Norrland have been crossed with *Picea asperata*, *P. sitchensis* and continent spruce. Crosses of birches and of aspen species have also been effected.

707 SYRACH LARSEN, C.

Planning forests of the future.

Dan. Foreign Off. J. 1955 : No. 16 : 15-17.

This popular article describes methods of forest tree breeding used in Denmark.

708 PAUL, B. H.

Importance of wood quality in tree breeding.

J. For. 1955 : 53 : 659-61.

It is suggested that the emphasis placed on

breeding for rapid growth and resistance to diseases and insect pests has resulted in the question of wood quality being neglected. More attention should be placed upon the timber qualities of the tree, such as density, specific gravity and shrinkage, in future forest-tree breeding programmes.

709 LANGNER, W. & STERN, K.

Versuchstechnische Probleme bei der Anlage von Klonplantagen. (Problems in experimental technique in the lay-out of clonal plantations).

Z. Forstgen. Forstpflanzenz. 1955 : 4 : 81-88.

With a view to combining seedling raising with clonal tests, and thus economizing in the amount of land required, various methods of combining these two functions are discussed. The use of randomized blocks would appear to ensure adequate cross pollination and at the same time provide a suitable statistical method of comparing the merits of different clones.

710 KRAHL-URBAN, J., KANITZ, H. R. & PUNIN, W.

Über den Nachweis von Agglutininen an Früchten und Blättern der Stiel- und Traubeneiche (*Quercus pedunculata* Ehrh. und *Quercus sessiliflora* Salisb.). [On the identification of agglutinins in the fruits and leaves of the pedunculate oak and the sessile oak (*Q. pedunculata* Ehrh. and *Q. sessiliflora* Salisb.).]

Z. Forstgen. Forstpflanzenz. 1955 : 4 : 18-20.

Differences in the reaction of a number of microorganisms to saline acorn extracts and differences in the anti-A₁ agglutinin and anti-O agglutinin contents of extracts obtained from the leaves indicated that these two methods provide a useful means of distinguishing trees of one provenance from those of another.

711 BESKARAVAŇNÝĚ, M. M.

(Coalescent roots of some forest trees found around Kamyšin).

Agrobiologija (Agrobiology) 1955 : No. 3 : 78-89. [Russian].

Morphological changes observed in the components of natural grafts between *Acer platanoides* and *A. tataricum*, *Pinus sylvestris* and *P. pallasiana* and *P. sylvestris* and *P. banksiana* are described. It is thought that the modifications are heritable and may be valuable in breeding.

- 712 FERENC, K.
Erdészeti genetika és a hazai nyárne-
mesítés. (**Forest tree genetics and
the breeding of poplars in our
country**).
Erdész. tudomány. Intéz. Évk. 1952 :
2 : 51-68.
- Descriptions are given of a series of F_1 inter-
specific hybrids effected with the object of
obtaining drought resistant poplars of satis-
factory shape for the Hungarian Plain.
- 713 MÜLLER, R.
Beitrag zur Beurteilung der *P. trichocarpa*
Hook. (**Contribution to the assess-
ment of *P. trichocarpa* Hook.**).
Z. Forstgen. Forstpflanzenz. 1955 : 4 :
16-17.
- Old existing trees of *Populus trichocarpa* in
Germany appear to belong to a single clone, but
material obtained from Belgium and the USA
proved morphologically dissimilar to German
trees. The writer suggests that, with a suitable
selection of clones, *P. trichocarpa* could be grown
as successfully in Germany as it is in the USA.
- 714 MILLER, G. N.
**The genus *Fraxinus*, the ashes, in
North America, north of Mexico.**
Mem. Cornell agric. Exp. Sta. 1955 :
No. 335 : Pp. 64.
- In this taxonomic survey of the genus *Fraxinus*
in North America, based on studies of morpho-
logical variation, twelve species are recognized
as distinct. Of these, *F. americana* and *F.*
pennsylvanica are regarded as polytypic species,
each comprising several geographically limited
subspecies, and are thought to be the parents of
the putative hybrid *F. biltmoreana*.
- 715 GRIFFITH, A. L.
**The possibilities of tree-breeding
and of tree seed orchards in East
Africa.**
E. Afr. agric. J. 1955 : 20 : 241-44.
- After a survey of Scandinavian forest tree
breeding with reference to the possible applica-
tion of Scandinavian methods to the breeding of
softwoods in East Africa, the work so far
achieved by the East Africa Agriculture and
Forestry Research Organization in Kenya is
outlined. This includes the selection of superior
stands of cypresses and pines for seed produc-
tion, the establishment of seed orchards and the
investigation of techniques for vegetative propa-
gation.
- 716 KLEINSCHMIT, R.
Einzelstammabsaaten von Plusvarianten
der Europäischen Lärche (*Larix decidua*
Miller) aus frei abgeblühtem Saatgut als
Hilfsmittel zur Beurteilung der Erban-
lagen. [**Single-tree progenies of plus
variants of the European larch (*L.*
decidua Miller) from open-pollinated
seed as an aid in assessing hereditary
constitution**].
Z. Forstgen. Forstpflanzenz. 1955 : 4 :
1-15.
- The results are presented of a statistical analysis
of the more important morphological charac-
teristics, such as height, angle of branches,
spread of crown and number of side branches,
of the progeny of 14 open-pollinated plus trees
of different provenance. Two main types are
distinguished: (1) trees with a slender growth
habit, thin branches, light-green needles, small
crowns and a narrow angle between the side
branches and the main stem and (2) trees with
thick branches, large grey-green needles, spread-
ing crowns and a wide angle between the
branches and the main stem. Trees with thick
branches had a sturdier appearance than those
with a slender habit, but the latter type grew
faster and had more branches.
- 717 WOOD, R. F.
**Studies of North-west American
forests in relation to silviculture in
Great Britain.**
Bull. For. Comm., Lond. 1955 : No. 25 :
Pp. 42.
- This bulletin includes a chapter discussing
problems of provenance in relation to seed
collection and the introduction of the following
species into Britain: Sitka spruce, Douglas fir,
Pinus contorta, *Tsuga heterophylla*, *Thuja plicata*,
Abies amabilis and *A. grandis*.
- 718 MEHRA, P. N. & KHOSHOO, T. N.
Cytology of conifers.
Sci. & Cult. 1955 : 21 : p. 46.
- The chromosome numbers of 47 species of the
Abietaceae, Taxodiaceae, Cupressaceae, Podo-
carpaceae and Taxaceae are listed.
- 719 SIMAK, M. & GUSTAFSSON, Å.
Fröbeskaffenheten hos moderträd och
ympar av tall. (**Seed properties in
mother trees and grafts of Scots
pine**).
Medd. SkogsforsknInst. Stockh. 1954 :
44 : No. 2 : 1-73.
- From a comparison of the seed produced by six
mother trees in central and northern Sweden
with that from the corresponding grafted trees

grown under favourable climatic conditions near Stockholm, it is concluded that, although certain morphological characters such as size and shape of the micropyle are constant for any one genotype, other characters, including seed size, quality and colour, are subject to environmental modification. The seed from the grafted trees was generally superior in quality to that from the mother trees, especially in the northern genotypes, the higher germinating capacity of the former being related to the better embryo development occurring under favourable conditions.

- 720 NILSSON, B.
Markbehandlingens inverkan på blomsättning och fröbeskaffenhet hos ympträd av tall. (The effect of field treatment on flower setting and seed characters in grafted pines).

Årsberätt. För. Växtf. Skogstr. 1954 : 51-54; and Svenska SkogsvFören. Tidskr. 1955 : 53 : 305-08.

Ploughing resulted in significantly greater acceleration of flowering in six and seven year old pine clones at Brunsberg, Sweden, than banking up or no treatment. Treatment had little or no effect on cone or seed characters, but there were significant interclonal differences both in flowering response and in cone length.

- 721 BERGMAN, F.
Försök med tvångsfruktificering av tall, gran och björk. (Experiments on induced fruiting in pine, spruce and birch).

Årsberätt. För. Växtf. Skogstr. 1954 : 57-86; and Svenska SkogsvFören. Tidskr. 1955 : 53 : 275-304.

Fertilizer treatment, ringing, strangulation and root pruning were tested, individually and in various combinations, for efficacy in stimulating flowering and seed production in pines at Sundmo and Björna, Sweden. The most effective method was root pruning combined with potassium fertilizer treatment; ringing and strangulation each increased flowering but tended to weaken the trees. Flowering was stimulated in birch and spruce by strangulation, the only method tested on these species.

- 722 KALNINJŠ, A. I. [KALNIŠ, A.], RUPAIŠ, E. A. [RUPAIS, E.] & MIJUTINA, S. V. [MIJUTINA, S.].
(Investigations of leaves of highly resiniferous pines).

Latv. PSR Zināt. Akad. Vestis 1955 : 3 : 79-86.

Resin yield of *Pinus sylvestris* is correlated with

the number and size of resiniferous ducts in the leaves.

- 723 RIGHTER, F. I.
Forest tree improvement research in California.

J. For. 1954 : 52 : 681-83.

A brief popular account of the work of the Institute of Forest Genetics in Placerville, Calif. is presented. The institute is concerned mainly with breeding pine for resistance to fungous diseases and insect pests and a number of interspecific crosses, of which the F_1 , F_2 and back-cross generations are at present under study, have been carried out to this end.

- 724 MÜLDER, D.
Beitrag zur Individualauslese bei der Blasenrost-Resistenzzüchtung mit *Pinus strobus*. (Contribution to individual selection in breeding for resistance to blister rust in *P. strobus*).

Z. Forstgen. Forstpflanzenz. 1955 : 4 : 89-99.

At Göttingen University, selection for comparative resistance to *Cronartium ribicola* was effected by an examination of stands containing both infected and noninfected individuals. As susceptibility to the fungus increases with the age of the tree, care had to be taken to ensure that only trees of like age were compared. Similarly, as the pathogen has a greater chance of establishing itself on trees with a broad crown, a character that may be affected by external environmental factors, it was found advisable to take the size of the crown into account when carrying out the selection process. External environment normally appears to exercise little or no effect upon severity of infection. Although all trees are liable to infection when they have aged, genetically determined differences exist in the stage of development at which the individual tree becomes liable to attack and in the extent to which it is damaged. For breeding purposes it is suggested that selection and vegetative propagation of resistant trees in nurseries, followed later by interclonal hybridization, offers the best prospects for reducing damage caused to stands of *P. strobus* by blister rust.

- 725 HOLST, M. & HEIMBURGER, C.
The breeding of hard pine types resistant to the European pine shoot moth (*Rhyacionia buoliana* Schiff.).
For. Chron. 1955 : 31 : 162-69.

The resistance of pine species of the Laricines group to *R. buoliana* and *R. frustrana* is surveyed, particular attention being given to the view that resistance is associated with a high

level of resin production. The possibility of using *Pinus nigra* and *P. thunbergii* as sources of resistance in breeding improved types of *P. resinosa* and *P. sylvestris* in North America is discussed. It is suggested that *P. densiflora*, although susceptible, would provide a useful intermediate in such a breeding programme since it hybridizes readily with other species.

VEGETABLES

- 726 **New vegetable varieties. List 1.**
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 503-25.

Information is given on the origin and main characteristics of vegetable varieties released by institutes and other official organizations in the USA and Canada during 1936-54.

- 727 PHILIPP, F.
Ergebnisse der Sommergemüsesortenversuche 1954. (Im Rahmen der österreichischen Zuchtbuchkommission).
[Results of trials of summer vegetable varieties, 1954. (In connexion with the committee on the Austrian register of cultivated varieties)].
Mitt. Klosterneuburg 1955 : Ser. B : 5 : 184-204.

Brief data are presented on new varieties of lettuce, gherkin, cucumber and tomato tested at the Federal Agricultural Research Station, Schönbrunn, in 1954.

- 728 LAMM, R., TOMETORP, G. & ÅVALL, H.
Klassificerande sort- och stamförsök med köksväxter 1952-1954. (Classificatory trials of varieties and strains of vegetables, 1952-1954).
Medd. Trädgårdsförs. 1955 : No. 90 : Pp. 54.

Brief descriptions are given of new and promising varieties tested during the above period at the Alnarp State Horticultural Station, Sweden. The list comprises beans, peas, lettuce, tomato, cucumber, cauliflower, onion, carrot, leek and garden beet.

- 729 WALKOF, C. & NUTTALL, V. W.
Hybrid vegetables for short-season gardens.
Publ. Dep. Agric. Can. 1955 : No. 947 : Pp. 7.

As the result of tests at the Morden Experimental Station, Man., the following F_1 hybrids are recommended: the bush tomatoes Mustang and Monarch and staking type Early Giant; the cucumbers Morcrop and Supercrop; the

squash Faribo R, for winter storage; the muskmelon Morden Hybrid; the cabbage O-S Cross, a winter-storage type; the onions Magnifico and Autumn Glory; and the sweet corns Seneca Dawn and Sugar Prince. The water-melon Faribo 57 is recommended for trial only. Mustang and Monarch have surpassed Early Chatham and Bounty in total yield of marketable fruit. Data obtained during 1950-54 suggest that hybrid tomatoes are more resistant to adverse environmental conditions than ordinary varieties.

- 730 ARASIMOVIČ, V. V.
(Variation in chemical composition of vegetables and fruit under the conditions of the Leningrad province).
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 113-24. [Russian].

Data are given showing the ranges in sugar, dry matter and vitamin content found in a number of varieties of the main vegetables and fruits examined at the Institute of Plant Industry in Leningrad. Savoy cabbage varieties had regularly higher contents of dry matter and vitamin C than headed cabbage varieties and differences were noted between different plants of the same variety. The highest content of vitamin A in carrots was found in the varieties Moskovskaja Zimnjaja [Moscow Winter] and Parižskaja Karotelj (= Carottelle Parisienne) with 17-18 mg. %. Variations in content of vitamin C and sugars were observed in different plants of the same variety also in black currants and raspberries; in such varieties it should be possible to effect improvements by means of individual plant selection.

- 731 BANGA, O., DE BRUYN, J. W. & SMEETS, L.
Selection of carrots for carotene content. II. Subnormal content at low temperature.

Euphytica, Wageningen 1955 : 4 : 183-89.
At the Wageningen Institute of Horticultural Plant Breeding, Netherlands, four varieties grown at 8°C. had lower total carotenoid contents and developed longer and more slender and tapering roots than the same varieties grown at 18°C. It is suggested that carrots grown at the lower temperature remain immature for a longer period of time and that in selecting for carotene content both dry weight, indicating stage of development (cf. *PBA*, Vol. XXV, Abst. 2436), and shape, indicating degree of ripeness, should be taken into account.

732 BANGA, O.

Carrot yield analysis.

Euphytica, Wageningen 1955 : 4 : 116-26.

From an analysis of factors governing yield in three varieties on plots at three stations in the Netherlands, it is concluded that length and shape of the root are the simplest and most reliable indicators of productive capacity.

733 KÜPPERS-SONNENBERG, G. A.

Neuere Versuche über den Einfluss von Schnittzeit, Düngung und Sorte auf den Ertrag und Futterwert der Topinambur. (Recent trials on the influence of time of cutting, manuring and variety on the yield and feeding value of the Jerusalem artichoke).

Z. PflBau. 1955 : 6 : 115-24.

Recent research in Germany on the best methods of cultivating the Jerusalem artichoke is summarized. In varietal trials in Oldenburg in 1952-53, Traube Vollbehang gave the highest yields of leaves, root and dry matter and also had the highest starch content.

734 BERNÝ, M. & JIRÁNEK, J.

Šlechtění rané mrazuvzdorné cibule seté. (Breeding of an early, winter-hardy form of common onion).

Sborn. čsl. Acad. zeměd. Věd 1955 : 28 : 101-16.

Breeding work on *Allium cepa* at Průhonice and Litol, aiming at the development of varieties that may be sown in August for early production in the following year, has begun. The methods include intervarietal and interspecific hybridization and selection, particularly of Všetatská Setá [Všetatská Sowing], which was outstanding among all other varieties in earliness and resistance to bolting.

735 MOLL, R. H.

Receptivity of the individual onion flower and some factors affecting its duration.

Proc. Amer. Soc. hort. Sci. 1954 : 64 : 399-404.

Under field conditions in Southwestern Idaho little or no loss in stigma receptivity was detected during the first 3 days the flowers were open; under laboratory conditions no loss in receptivity occurred until the flowers had been open for 5 days. Receptivity was lost after the flowers had been open 6 or 7 days. In F_1 hybrid production, small differences in the average blooming dates of two otherwise desirable

parents might be largely overcome by increasing the proportion of pollen rows.

736 KAZAKOVA, A. A.

(Local onions of the northern zone of the USSR).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 13-21. [Russian].

Various onion types that have been developed by local selection in Estonia, Latvia, Karelia and the northern provinces of Russia are described. Indications are given of earliness, yield, number of bulbs per cluster, size of bulb, tendency to bolting and keeping capacity. The onions of this zone are multiplied vegetatively and are classed botanically as *Allium ascalonicum*. Some of them are considered valuable for use in crossing with varieties of *A. cepa*.

737 ATKIN, J. D. & DAVIS, G. N.

Altering onion flowering dates to facilitate hybrid seed production.

Bull. Calif. agric. Exp. Sta. 1954 : No. 746 : Pp. 16.

Experiments were carried out on the effects of storage temperature and date of planting the bulbs upon flowering date, number of seed stalks, number of flowers per umbel and seed yield. The results indicated the possibility of adjusting storage temperatures and planting dates so that the parental lines used in hybrid production flower at approximately the same time. Early planting dates and storage at 50° F. resulted in earlier flowering and the highest yield of seed in all the varieties studied. Use of the later flowering line as ♀ is advocated if the flowering times of the two parents cannot be adjusted to coincide.

738 ERICKSON, H. T. & GABELMAN, W. H.

Potential value of inbreds and F_1 hybrid onions for seed production.

Proc. Amer. Soc. hort. Sci. 1954 : 64 : 393-98.

Compared with inbred lines, the F_1 hybrids produced 91% more seed, a higher proportion of it being classed as medium and heavy. The greater seed production of the hybrids was associated with a higher number of seed stalks, probably resulting from greater bulb size, and with increased seed production per head. The problem of the relative merits of single and multiple crosses in the commercial production of hybrid seed is discussed.

- 739 MARTINOLI, G.
Cariologia di alcune specie del genere *Allium* (Liliaceae) della Sardegna. [Caryology of certain species of the genus *Allium* (Liliaceae) from Sardinia].
Caryologia 1955 : 7 : 145-56.
Studies of root-tip cells are reported for three species, full descriptions being given of the idiograms. In *A. subhirsutum* $2n = 14$, in *A. parviflorum*, a species endemic to Sardinia and neighbouring islands, $2n = 16$ and the caryogram shows marked similarities to that of *A. moschatum*; in *A. sphaerocephalum* var. *sardoum*, endemic to Sardinia, $2n = 32$, which is double the number reported by previous authors for *A. sphaerocephalum*.
- 740 ONO, R.
(Meiotic irregularities in *Allium victorialis* subsp. *platyphyllum*).
Senshokutai (Chromosome)/Kromosomo 1953 : Nos. 17-19 : 639-41. [Japanese].
Chromosome bridges, fragmentation, laggards and disturbances in spindle polarity were noted.
- 741 VASILEVSKAJA, V. K. & LIZGUNOVA, T. V.
(Some characteristics of the phasic development of cabbage).
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 40-51. [Russian].
Observations were made on the growing points of 25 varieties, including forms of white and red cabbage, Brussels sprouts and kale. Illustrations are given showing the morphological changes that come about when the vernalization stage has been completed and the floral organs begin to form. In early varieties this happened in Leningrad in the autumn of the year of sowing, whereas in late varieties it occurred only in the following spring; the latter group constitutes the varieties with good keeping capacity, the former those with the greatest tendency towards bolting. The late group comprised only cabbage varieties, the latest of all being Belorusskaja, Amager 611 and Zimovka [Winter cabbage].
- 742 ROLL-HANSEN, J.
Vegetativ formering av kvitkål for frøavl. (Vegetative propagation of cabbage for seed production).
Norsk Hagetidend 1954 : No. 6 : unpaginated.
A technique is described for maintaining and multiplying desirable material by vegetative propagation with leaf cuttings treated with a hormone preparation.
- 743 KRICKL, M.
Vordringliche Aufgaben der Kopfkohlzucht. (Urgent tasks in cabbage breeding).
Saatgutwirtschaft 1955 : 7 : 225-28.
It is claimed that the emphasis placed on breeding for good keeping quality, satisfactory external appearance and uniformity has led to the neglect of internal characteristics such as compactness of the leaves and low stem/leaf ratio in the head. Initial breeding experiments along these lines in Austria have shown that it is possible to select for improvement in the inner quality of the head. Lines of red cabbage with greater compactness of the leaves, a reduced stem/leaf ratio in the head and shorter stalks have been raised by selection and propagation of elite plants over a number of generations at Neusiedl, Burgenland and at Zinsenhof, Lower Austria. The character short stalk was found to be closely associated with the size and compactness of the head.
- 744 HOROVITZ, S. & PERLASCA, G.
Genética de la floración normal del repollo en el trópico cálido. (Genetics of normal flowering of cabbage in the torrid tropics).
Agron. trop., Venezuela 1954 : 4 : 81-93.
Except for the bolters, which produce no heads, cabbages in Venezuela do not come into flower. A few plants, with a frequency of about 5×10^{-3} , of the variety Wisconsin All Season came into flower however and have given rise to the variety Sanare (cf. PBA, Vol. XXV, Abst. 3474). The same has now been observed in Blanco Amager [White Amager] and in an unnamed red cabbage. Flowering was induced in an Italian cabbage, Crespo, by cold treatment, after which it was crossed with Sanare. The F_1 plants headed normally but did not flower; they were induced to do so by cold treatment and gave an F_2 consisting of 98 plants that did not flower: 13 that flowered; the back cross with Sanare had 63 plants that flowered and 55 that did not. The capacity to flower in the tropics is thus conditioned by a recessive gene, designated t . Possible causes of the deficiency of recessives in the F_2 and back cross are examined. From the frequency of t in populations of Wisconsin All Season it is calculated that the heterozygote has a selective advantage, with a coefficient $S = 0.075$.
The tropical types extracted from Amager and the red cabbage when crossed with Sanare gave F_1 generations which also flowered normally, that from the red cabbage being rather late and irregular; it is evident that both are conditioned

by the same gene *t*, modifiers being operative in the case of the red cabbage.

- 745 BRANDENBURG, E. & BUHL, C.
Über das Vorkommen von Molybdänmangel bei Blumenkohl in Westdeutschland und seine Verhütung. (**On the occurrence of molybdenum deficiency in cauliflower in western Germany and its prevention**).
Z. PflKrankh. 1955 : 62 : 514-28.

The role of molybdenum in plant growth is discussed and illustrations are given of stunted growth and failure to form flowers in cauliflower when the soil is deficient in this element. Varietal differences were observed in ability to absorb molybdenum from the soil. In land deficient in molybdenum, Le Cerf [Stag] and Erfurter Zwerg [Erfurt Dwarf] were less affected than varieties of the Alpha group such as Delfter Markt [Delft Market] and Gloria.

- 746 MOORE, J. F. & ANSTEY, T. H.
A study of the degree of natural selfing in green sprouting broccoli (*Brassica oleracea* L. var. *italica* Plenck.), a normally cross-pollinated crop.
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 440-42.

In five localities in Washington and British Columbia where one tester plant carrying the gene pair *Ggl* for normal *vs.* glossy was surrounded by eight normal individuals, the average amount of natural selfing was 50%. In four other localities where one tester and one normal plant were grown together, 76.5% selfing occurred on the average.

- 747 ZEEVAART, J. A. D.
Heterosis in Brussels sprouts, especially with reference to cold resistance.
Euphytica, Wageningen 1955 : 4 : 127-32.

Inbreeding of the varieties Kolom and Spiraal resulted in a reduction in vigour and quality. On crossing inbreds which had survived the winter, plants of better quality and greater cold resistance than the original varieties were obtained; the latter effect is attributed to natural selection of cold-resistant plants among the inbreds.

- 748 JANICK, J. & STEVENSON, E. C.
A genetic study of the heterogametic nature of the staminate plant in spinach (*Spinacia oleracea* L.).
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 444-46.

From data on the variety Long Standing

Bloomsdale it is postulated that pistillate monocious plants have the constitution XX and staminate individuals the constitution XY or YY (cf. *PBA*, Vol. XXV, Abst. 2458). XY plants may or may not produce seed, whereas YY do not bear seed.

- 749 THOMPSON, A. E.
Methods of producing first-generation hybrid seed in spinach.
Mem. Cornell agric. Exp. Sta. 1955 : No. 336 : Pp. 48.

Experiments were carried out on the effects of spacing, N supply, seed-size separation, injection of urea and glucose, mutilation, temperature, day length, planting date, seed age and spraying with maleic hydrazide upon the sex ratio. Only spacing, day length, temperature and planting date caused significant modifications, marked varietal differences in response being obtained. None of these treatments is however considered an effective means of securing a large proportion of ♀ plants for use in producing F_1 seed. Selection of different classes of plants on the basis of female value (percentage of ♀ flowers per plant) was effective but the association between the parental ♀ value and the progeny mean was not as close as anticipated, partly on account of the considerable phenotypic fluctuation in this value. The effects of environmental factors upon the sex ratio are discussed in relation to the selection of monocious plants for inbreeding and the maintenance of inbreds. Crosses of the type ♀ x monocious gave progenies with highly ♀ values. Two methods of predicting the progeny means for ♀ value in such crosses are discussed. The author suggests procedures for selecting highly ♀ monocious lines, and for the production of F_1 seed, using strictly ♀ plants or highly ♀ monocious parents in combination with a male line consisting of a selected variety or highly ♂ inbred.

- 750 THOMPSON, A. E.
The extent of natural crossing in inbred monoecious spinach lines.
Proc. Amer. Soc. hort. Sci. 1954 : 64 : 405-09.

Investigations were carried out at the University of Illinois to determine the extent of natural crossing between three ♀ and ten ♂ parental lines, with the aid of *rg* for rugose leaf as marker. The ♀ and ♂ parents had mean values of 45.7-64.0 and 11.0-79.9% for femaleness respectively. Percentage of natural crossing ranged from 19.6 to 96.8%. The amount of natural crossing varied according to the female or male parent and corresponded closely to the

mean value of the ♀ parents for femaleness. The use of monocious inbred lines for the production of F_1 hybrid seed is considered to be practicable; male lines should be selected for their ability to disperse a large amount of pollen over a relatively long period.

- 751 BENEŠ, V.
Příspěvek k historii vzniku a metodice vyšlechtění odrůdy celeru Olomouckého. (Notes on the origin of the celery variety Olomoucký and methods used in developing it).
Sborn. čsl. Acad. zeměd. Věd 1955 : 28 : 93–100.

This new selection from Olomouc is notable for high yield, good quality of tubers and resistance to drought and *Phoma*.

- 752 BUZULIN, G. S.
(Outdoor varieties of water melons and melons for the central zone of the USSR).
Priroda (Nature), Leningrad 1955 : No. 7 : 105–07. [Russian].

The melon Pionerka [Pioneer] (Kommunarka Mičurina x Nesravnennaja [Incomparable]) and the water melon Mičurinskii OI (Melitopolj 142 x Stokes), both from Mičurinsk, combine earliness and good fruit quality and can be grown in the open.

- 753 BELIK, V. F.
(The water melon Muravlevo).
Agrobiologija (Agrobiology) 1955 : No. 3 : 130–31. [Russian].

Work at Birjučii Kut on the improvement of fruit quality by selection of this land variety, distinguished by high yield and good keeping properties, is referred to briefly.

- 754 WALL, J. R.
Interspecific hybrids of *Cucurbita* obtained by embryo culture.
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 427–30.

Vigorous hybrids have been obtained from *C. pepo* x *C. moschata* and the reciprocal by embryo culture of the F_1 seeds. Some of the hybrids were produced by using embryos only 3 mm. in length.

- 755 HUSSEIN, F. & HENEEN, W. K.
Polysomaty in *Cucurbita pepo*.
Bot. Notiser 1955 : 108 : 391–99.

At Cairo University, disomatic metaphase plates ($4n = 80$) have been observed in the outer cells of the tips of both primary and secondary roots, their frequency being inversely proportional to root length during the first two days after germination and decreasing to a low but steady

value in older roots. The metaphase chromosomes of the disomatic cells were mostly unpaired in the shorter roots (1–2 cm.) and paired in the longer roots.

- 756 WALKER, J. C. & PIERSON, C. F.
Two new cucumber varieties resistant to scab and mosaic.
Phytopathology 1955 : 45 : 451–53.

Wisconsin SMR 9 and Wisconsin SMR 12, which were released by the University of Wisconsin in 1954, were developed from a cross between a homozygous scab-resistant F_3 plant from Maine 2 x Chicago Pickling and the mosaic-resistant line M–20, backcrossed five times to M–20. Both varieties yield well and resemble National Pickling in vine type and season of maturity. The length/breadth ratio of the fruit of Wisconsin SMR 9 resembles the ratio of Ohio MR 17, while that of Wisconsin SMR 12 is intermediate between those of the latter variety and National Pickling.

- 757 VIŠNEVSKIĖ, S. I.
(New tomato varieties for the processing industry).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 7 : 16–18. [Russian].

Ahtuba 85 from Stalingrad and Štambovyi 5 [Determinate 5] from Simferopolj are distinguished by productiveness and a high percentage of solids. Ahtuba 85 is as early as Majak [Lighthouse] and its fruits are larger; Štambovyi 5 produces smaller fruits than Majak.

- 758 ROZEN, G. JA.
(Horticulture in the People's Republic of Bulgaria).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 7 : 26–29. [Russian].

Mention is made of the following tomato varieties bred recently in Bulgaria. Zarja [Dawn] (= Break o' Day) x Kometa [Comet] and No. 10 x Bison are notable for productiveness, earliness and good fruit quality and flavour. Plovdivskie Konservy [Plovdiv Processing], obtained by crossing *Lycopersicon racemigerum* with the cultivated variety Zarja, is outstanding among the processing varieties for its flavour and high sugar and vitamin contents. Sofia and Izobilie [Abundance] are new determinate outdoor varieties and variety 101/4 and the hybrids No. 10 x Rutgers and No. 10 x Plovdivskie Konservy are specially adapted to cultivation in montane regions.

- 759 SINGH, H. B. & SIKKA, S. M.
Pusa has some outstanding tomatoes.
Indian Fmg. 1955 : 5 : No. 3 : 18–25.
Sioux, an American introduction (cf. PBA, Vol.

XVI, Abst. 1599), and Improved Meeruti and Pusa Red Plum have given good performances under conditions in Delhi. Improved Meeruti, a selection from Meeruti, is a profusely branched semidwarf variety with medium-sized, multi-locular fruits which are slightly furrowed and have an acid flavour making them suitable for cooking. It may be grown as an autumn-winter or a spring-summer crop. The parentage of the virus-resistant variety Pusa Red Plum (Hybrid 6) includes *Lycopersicon pimpinellifolium*. The fruits are small, have an excellent flavour and high sugar content and contain 50–60 mg./g. of vitamin C. It is most suitable for raising as an autumn-winter crop. Both varieties were developed at the Indian Agricultural Research Institute, New Delhi.

- 760 JOHNSTONE, F. E. (JUN.) & HOLMES, R. T.
Tomato varieties for the northeast Georgia Piedmont.
Mimeogr. Ser. Ga. Agric. Exp. Sta. 1955 : No. 2 : Pp. 6. (Mimeographed).

Information is provided on the yield, fruit characteristics and disease resistance of old and new varieties tested during 1950–54 at Athens, Ga. The F_1 variety Burpee Big Boy Hybrid gave the best all-round performance.

- 761 KENNERLY, A. B.
New tomatoes from Texas.
Sth. Seedsman 1955 : 18 : No. 6 : p. 27.

The high-yielding tomatoes Texo 1 (W-7) and Texo 2 (Step 193) have been released. Lines 11M and 24-1, both developed from Step 54 x Southland, and lines W-24, W-371, W-11 and W-120 have proved much superior to Rutgers in yield.

The water melon Charleston Gray (cf. *PBA*, Vol. XXV, Abst. 1478) is being used in breeding further varieties resistant to *Fusarium* wilt and anthracnose.

- 762 KERR, E. A.
Some factors affecting earliness in the tomato.
Canad. J. agric. Sci. 1955 : 35 : 300–08.

Farthest North was the earliest of 46 varieties investigated at the Horticultural Experiment Station, Vineland Station, Ont. Data on reciprocal crosses involving this variety indicate that xenia has no effect on earliness. No relationship between the number of seeds per fruit and earliness of the varieties was found although, within a variety, the fruits with most seeds matured soonest.

- 763 THOMPSON, A. E.
Inheritance of high total carotenoid pigments in tomato fruits.
Science 1955 : 121 : 896–97.

Webb Special possesses approximately twice the total amount of fruit pigments usually present in normal red tomatoes; Snowball has the lowest amount among the varieties tested. In crosses between Webb Special and Snowball, high amount of pigmentation depended upon the interaction of two recessive genes, hp_1 and hp_2 , which were independent of r^+ for the production of carotenoids in quantity, t^+ for the formation of lycopene and β carotene, t for the synthesis of polycopene and ζ carotene and y^+ for fruit-skin colour. The expression of r^+ and t^+ was unaffected by hp_1 and hp_2 . High production of pigment is associated with a high degree of fruit firmness.

- 764 WALKOF, C.
Double backcrossing as a possible method of developing an early, large-fruited tomato.
Diss. Abstr. 1954 : 14 : Publ. No. 8496 : p. 1126.

The early, small-fruited Farthest North and the late, large-fruited Early Jersey varieties were used for the initial cross in the development of reciprocal back-cross lines at the University of Minnesota. Two of the plants with the largest fruits and two of the earliest individuals were selected from the back crosses to Farthest North and Early Jersey respectively. These selections were selfed and back-crossed with their respective recurrent parents: the progenies obtained were tested in comparison with their parents and the F_1 . Selecting for increased fruit size in the back cross to Farthest North resulted in only slight gain, small fruit size probably being incompletely dominant. Earliness was partially dominant in the back crosses to Farthest North. The selfed progenies of the selections from the Early Jersey back cross ripened later than the average time obtained for the parent back cross. The earliest plants may not have been selected; it was concluded that larger numbers of selections for this character are required. The combinations of earliness with small fruit size and of lateness with large fruit in the parents are probably typical of the tomato and due to linkage. One selection from the Early Jersey back cross, however, gave a negative correlation between time of ripening and fruit size, probably as the result of crossing-over. Selection for a desired combination of characters is likely to be

more successful than selection for a single character.

- 765 HASKELL, G. & GAVIN BROWN, A.
Hybrid vigour in cultivated tomatoes.

Euphytica, Wageningen 1955 : 4 : 147-62.

In outdoor trials conducted at the John Innes Institution, Hertford, England over the period 1940-49, the yields of numerous hybrids of commercial varieties were generally greater than those of the standard varieties and showed less environmental variation. The early hybrids Hertford Cross (Potentate x Leaf Mould Resister) and Ware Cross (Potentate x ES1) gave consistently high yields and were of good quality.

- 766 RICK, C. M. & LAMM, R.
Biosystematic studies on the status of *Lycopersicon chilense*.
Amer. J. Bot. 1955 : 42 : 663-75.

L. chilense, hitherto regarded as a form of *L. peruvianum*, showed the following compatibility relationships: (1) self sterility; (2) cross compatibility with *L. peruvianum* var. *humifusum* and with a similar line designated LA124, giving a fertile F_1 but an F_2 which in the first case showed very low pollen fertility and in the second case poor seed germination; (3) cross sterility with other forms of *L. peruvianum* and with *L. glandulosum*; (4) a low degree of compatibility with *L. esculentum*, a few hybrids and back crosses of the F_1 to *L. esculentum* having been obtained. On the above evidence and on morphological and geographical grounds, *L. chilense* is regarded as a distinct species from *L. peruvianum*.

- 767 BREŽNEV, D. D.
(The role of environment in the formation of characters and quality in tomatoes).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No 1 : 52-59. [Russian].

Comparisons were made of plants of a number of tomato varieties grown from seed produced in several different places. For the variety Štambovyi 905 [Determinate 905], seed grown at Maikop gave the best results whereas for Bison the Maikop seed gave the worst results and the seed from Puškin near Leningrad the best. In most cases seed from plants grown out of doors produced better plants than seed from greenhouse plants. The best seed was not always that produced in the area where the plants were to be grown but rather that from the area with the most suitable conditions for a

given variety. The differences are regarded as hereditary and are taken as a confirmation of Lysenko's theory of inheritance.

- 768 HONMA, S. & CURRENCE, T. M.
Combining ability of five tomato backcross selections compared with that of the parents.

Proc. Amer. Soc. hort. Sci. 1954 : 63 : 431-39.

The use of the characters potato leaf (*c*) and green stem (*a*) as marker seedling characters to distinguish selfs and crosses obtained from F_1 hybrid seed produced with the aid of male steriles has been previously suggested by the second author (cf. *PBA*, Vol. XV, Abst. 396). Experiments have been carried out to determine whether male sterility (*ps*), potato leaf and green stem could be transferred to Firesteel without any other marked modification of the variety; *ps*, *c* and *a* are situated in linkage groups I, IV and V respectively. The recurrent parent Firesteel (*PsPs CC AA*), the S_1 of the non-recurrent parent NC-1-48 (*psps cc aa*), the F_3 of the initial cross NC-1-48 x Firesteel and the S_2 's of the first to the fourth back crosses were crossed with the testers Bounty, Break O'Day, Table Talk and Pennorange, the F_3 and S_2 plants having the genotype *psps cc aa*. Firesteel was superior to S_1 NC-1-48 in combining ability for early and total yield. The combining ability of Firesteel for early and total yield was recovered in the F_3 (NC-1-48 x Firesteel) but as back-crossing proceeded combining ability declined, falling below that of Firesteel. In three of the test crosses the recurrent parent was superior to S_1 NC-1-48 for combining ability for fruit size but inferior in the fourth. With respect to this character, two of the test crosses with F_3 (NC-1-48 x Firesteel) did not differ significantly from Firesteel; another cross was superior and the fourth inferior. All the back crosses had higher mean values for fruit size than Firesteel, the maximum size being attained in the BC_3 . It is suggested that the F_3 may yield a suitable *psps cc aa* strain equal to Firesteel in general combining ability.

- 769 IVANOVSKAJA, E. V.
(Crossing the tomato with *Cyphomandra*).

Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 19 : 57-63. [Russian].

An account is given of the fertilization processes observed in the flowers of the tomato variety Bison, grafted on a *C. betacea* stock, when fertilized by the pollen of *Cyphomandra*.

- 770 BORCHERS, E. A. & NEVIN, C. S.
Quantitative estimation of a bitter principle in tomato fruit.
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 420-26.

The tomato line T414, valuable as a source of resistance to southern bacterial wilt in breeding, is characterized by a heritable bitter flavour. Segregating populations may be classified with respect to relative concentration of the bitter principle by determining at 575 μ the absorption spectra of extracts treated with Mayer's reagent, which precipitates the bitter compound.

- 771 BREŽNEV, D. D.
(Varieties of tomato for irrigated horticultural regions).
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1951 : 29 : No. 1 : 5-12. [Russian].

In tests of a large number of varieties, some, not previously regarded as specially promising, gave the best crops on the new irrigated areas in Central Asia and in the Urals. Among the best were Birjučii Kut 414, Hybrid 190, Gruntovoi Skorospelyi 01165 [Outdoor Early 01165] and Puškinskii. These and related forms are recommended for use in breeding tomatoes suitable for irrigation. They are also distinguished by high quality and vitamin C content. Certain other varieties such as Earliana, Ponderosa, John Baer and Lučšii iz Vseh 318 [Best of All 318] gave good yields both with and without irrigation in these areas. Others displayed exceptional tolerance of drought; this group included some of the wild species.

- 772 HUDSON, P. S.
Soviet expert claims frost-free variety.
Grower 1955 : 44 : 395-99.

A brief review of the methods and achievements of the Russian vegetable breeder A. V. Alpatjev is given, with special reference to his work on breeding tomatoes for frost resistance.

- 773 JOHNSON, S. P. & HALL, W. C.
Parthenocarp in the tomato.
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 329-32.

Nine varieties were tested for their ability to produce parthenocarpic fruits under irrigated field conditions in Texas, with average weekly temperatures of 88-96° F. Style exertion and reduced pollen viability induced by high temperature were associated with parthenocarp, although their exact roles in this type of fruit formation were not determined. Variety 1388

(PI 190256 from New Caledonia) formed parthenocarpic fruit only above 95° F. The other varieties were parthenocarpic at the lower temperatures, with the exception of Marglobe and Rutgers which produced no fruit at all.

- 774 GOTHOSKAR, S. S., SCHEFFER, R. P., STAHMANN, M. A. & WALKER, J. C.
Further studies on the nature of *Fusarium* resistance in tomato.
Phytopathology 1955 : 45 : 303-07.

Extracts of Jefferson, a variety bearing a single gene for resistance to *F. oxysporum* f. *lycopersici*, had no inhibitory effect on the growth of the fungus *in vitro*. Cuttings of Jefferson and the susceptible variety Bonny Best both developed disease symptoms after treatment (cf. *PBA*, Vol. XXIV, Abst. 2544) with culture filtrates or with pectinase preparations, indicating that resistance cannot readily be attributed to a mechanism for detoxification present only in resistant plants. Since treatment with the respiratory inhibitors 2,4-dinitrophenol, thiourea, sodium fluoride and sodium diethyl dithiocarbamate broke down resistance in Jefferson but had no stimulating effect on the parasite *in vitro*, it is postulated that resistance is due to a very labile substance continuously formed at the expense of energy obtained from respiration processes.

- 775 REDDI, T. V. & SUBRAHMANYAM, J.
Cluster bearing in "Guttivanga", a variety of brinjal (*Solanum melongena* L.).
Andhra agric. J. 1954 : 1 : 230-32.

In a comparison of Guttivanga, which bears both single and clustered fruits, with the normal variety Pithapuram Long, in which the fruits are all single although some of the flowers are borne in cymes, it was observed that in the latter variety all but the central flower of each cyme is of the short-styled sterile type, whereas the clusters of the former contain a high proportion of long-styled or medium-styled fertile flowers; all the single flowers had long styles. The possible use of the clustered fruit character in breeding for higher yields is indicated.

- 776 JASMIN, J. J.
Male sterility in *Solanum melongena* L.: preliminary report on a functional type of male sterility in egg-plants.
Proc. Amer. Soc. hort. Sci. 1954 : 63 : p. 443.

Male sterility due to nondehiscence of the anthers has been found in the variety Blackie

(Black Beauty x Black Nagasaki), pollen development being normal. F_1 data suggest that this defect is recessive and may therefore be valuable in hybrid-seed production.

- 777 TANDON, S. L.
Colchicine treatment of *Abelmoschus esculentus* (L.) Moench.
 Sci. & Cult. 1955 : 21 : 39-40.

Plants raised from colchicine-treated seeds were late in flowering and produced a lower average yield of green fruits and much lower number of seeds per fruit than the controls.

- 778 REDDY, T. V. & JANKI DEVI, C.
A wild gogu, *Hibiscus furcatus* Roxb.
 Andhra agric. J. 1954 : 1 : 309-10.

H. furcatus, a wild species occurring in Andhra and other parts of India, is briefly described and the possibility of selecting glabrous types for use as a leaf vegetable is noted. It appears to be highly drought resistant and may be useful for improving *H. cannabinus* and *H. sabdariffa*.

- 779 VENKATARAMANI, K. S.
Some observations on blossom biology and fruit formation in *Hibiscus esculentus*.
 J. Madras Univ. 1953 : 23 : 1-14.

Floral biology and fruit development were studied in six varieties of okra at the University Botany Laboratory, Madras. The amount of natural crossing ranged from 4.0 to 31.7%, depending on the distance between the two parents. At room temperature (30°C.) the pollen grains lost their viability after 24 hours from the time of anther dehiscence, but when stored over CaCl_2 at 0°C. they remained viable up to 144 hours. Size of the flower bud a day prior to anthesis appeared to be a varietal characteristic.

- 780 MITCHELL, W. G.
New table legumes from Florida.
 Sth. Seedsman 1954 : 17 : No. 11 : 28, 88.

An account is given of the following culinary legumes produced at the Florida Agricultural Experiment Station:—

Bean. The snap bean Seminole is described (cf. *PBA*, Vol. XXIII, Abst. 3101). A promising wax bean, tentatively designated Florida 101, combines the good qualities of its parents Streamliner and Cherokee Wax. Florida 501 is an early, high-yielding pole bean with tender purple pods of good flavour. A selection from Pinto 5 x 191 is a promising, rust-resistant pole bean, earlier and more productive than 191. Crossing of snap beans with scarlet runners and other species is in progress.

Lima bean varieties are being crossed with wild beans in an attempt to produce types with hypogeal cotyledons.

Cowpea. The vigour and good pod characters of Korean Crowder make it valuable as a breeding stock but it is not sufficiently disease-resistant to be released. Two high-yielding lines are 15,2,2,1, an early white-seeded line, and 16,10,2,2, which resembles Dixielee in most respects but has longer pods.

Pea. The breeding line P84 is of high quality and has outyielded Little Marvel, producing nine or ten seeds per pod.

- 781 WATERHOUSE, W. L.
Studies of bean anthracnose in Australia.

Proc. Linn. Soc. NSW 1955 : 80 : 71-83.

The results are presented of two sets of studies of the host-parasite relationship between *Colletotrichum lindemuthianum* and bean varieties carried out at the University of Sydney. Of 12 isolates studied in the first series of experiments, 11 were found to be identical with the American β strain; the strain isolated from the twelfth isolate was designated Aust. A. In the second set of experiments, 14 more isolates were studied and seven races of the pathogen differentiated. It is concluded that, in addition to the American β strain, at least 8 physiological races of the fungus exist in New South Wales. They are designated Aust. 1 to Aust. 8. Of 130 bean varieties tested for their reactions to these eight physiological races, 98 proved resistant. Dwarf varieties of bean proved the most susceptible.

- 782 KRASSOWSKA, W.
 Czteroletnie doświadczenia odmianowe z fasolą. (**Four-year varietal studies of the French bean**).
 Roczn. Nauk rol. 1955 : 70 : Ser. A : 415-29.

Nine varieties, mainly Polish, of *Phaseolus vulgaris*, grown for the dry bean, were studied during 1949-52 at the Puławy Institute of Plant Breeding and Acclimatization.

Norida gave the most uniform yields and the highest average yield for the three years 1950-52. During the four years 1949-52, Wiejska [Country] exhibited the highest 1000 seed weight in three years, being excelled by Biała Exportowa [White Export] only in 1950. Norida and Kraków were the two earliest varieties and the two selections Perłówka Puławska [Puławy Pearl] and Perłówka Skierniewicka [Skierniewice Pearl] the latest. Observations during the three years 1949-51 showed that the dwarf varieties were

least susceptible to diseases due to fungi, bacteria and viruses.

- 783 JOUBERT, T. G. LA G. & VERMEULEN, W. J.

A new pole-bean variety "Green Savage."

Fmg. in S. Afr. 1955 : 30 : 297-98.

Green Savage (Savage x Canfreezer), introduced from the USA (cf. *PBA*, Vol. XX, Abst. 29), has given the highest yields among the varieties tested at the Horticultural Research Station, Pretoria. Its canning quality is good.

- 784 ROSIĆ, K.

Istorijska kultura i izvorne forme *Phaseolus vulgaris* L. (**The history of cultivation and the original form of *Ph. vulgaris* L.**).

Biljne Proizvod. (Pl. Prod.) 1954 : 78-89.

It is concluded, on the basis of recent research on the origin of wild forms of *Phaseolus*, that the ancestral species was characterized by a high warmth requirement and susceptibility to frost and drought. This should be taken into account when breeding beans.

- 785 FAROOQUI, H. M. & MCCOLLUM, J. P.
Relation of morphological structure and development to seed coat rupture in beans (*Phaseolus vulgaris* L.).
Proc. Amer. Soc. hort. Sci. 1954 : 63 : 333-41.

Seed-coat rupture was associated with conditions most favourable to plant growth during the time of seed development, a relationship being found between high yield and increased percentage of rupture. Rate of seed development, however, bore no relationship to rupture in susceptible or highly resistant varieties. Marked intervarietal differences in rupture did not appear to depend upon the structure of the seed coat. The high incidence of abnormally large and long cotyledons in susceptible strains suggested that the formation of such cotyledons may be a factor responsible for rupture. Rupture in plants from ruptured seed was no higher than in those from nonruptured seed of the same strain.

- 786 ROSIĆ, K.

Raskuvavanje — kao sortna osobina pasulja. (**Cookability, a varietal characteristic of the bean.**)

Biljne Proizvod. (Pl. Prod.) 1954 : 32-43.

Experiments at Peć showed that Yugoslav land varieties of *Phaseolus* cooked better than introduced foreign strains.

- 787 KRICKL, M.

Zur Frage der Züchtung von frostsicheren Bohnen, Gurken und Tomaten. (**On the question of breeding frost resistant beans, cucumbers and tomatoes.**)
Mitt. Klosterneuburg 1955 : Ser. B : 5 : 177-84.

Experiments carried out by the Schönbrunn Agricultural Research Station, Austria, from 1935 onwards with a view to improving the frost resistance and earliness of French beans, cucumbers and tomatoes are described. Selection was carried out at Grundlsee, Tamsweg and Saalbach, localities with inclement climates and at heights of 800, 1000 and 1200 m. above sea level, respectively. Frost resistant lines of the French bean variety Konserva, of the cucumber Sensation and of the tomato Bonner Beste adapted to the above localities have now been developed; they give higher yields under unfavourable climatic conditions and may be planted out earlier than the initial varieties from which they are derived.

- 788 ALLARD, R. W.

Natural hybridization in lima beans in California.

Proc. Amer. Soc. hort. Sci. 1954 : 64 : 410-16.

At Davis, Calif., the amount of natural hybridization varied from less than 1% to over 15%, according to the variety, distance between ♀ and ♂ parents and wind direction. The frequency of outcrossing declined rapidly at distances greater than 2½ ft., being very low at 32.5 ft. and practically nil at 100 ft. Similar amounts of natural crossing occurred in other localities in California. Thrips of the genus *Frankliniella* appeared to be the chief agents responsible for cross pollination.

- 789 BRANTLEY, B. B. & DEMPSEY, A. H.
Southern pea varieties for middle Georgia.

Mimeogr. Ser. Ga. Agric. Exp. Sta. 1955 : No. 7 : Pp. 10. (Mimeographed).

A summary is presented of data obtained on yield, number of days to first harvest, pod length, hand-shelling percentage, suitability for canning and reaction to *Fusarium* wilt, powdery mildew, bacterial blight and curculio (*Chalco-dermus aeneus*) from variety trials of different types of cowpea during 1947-54.

- 790 Soybeans for Texas.

Sth. Seedsman 1955 : 18 : No. 8 : 19, 65.

The use of the new strains developed at Renner by the Texas Research Foundation, combined with planting in mid-June, may make the

commercial production of soya beans a profitable undertaking in this state.

- 791 JOHNSON, H. W., ROBINSON, H. F. & COMSTOCK, R. E.

Estimates of genetic and environmental variability in soybeans.

Agron. J. 1955 : 47 : 314-18.

"Twenty-four characters in 2 populations of F_3 lines of soybeans were studied in the F_4 and F_5 generations of the lines. The lines were evaluated at 2 or 3 locations in 1950 and at 1 location in 1951. Variance components are presented for yield, height, grams per 100 seed, and oil percentage; and heritability and genetic advance for average performance over locations and years are presented for all characters measured. Estimates of genetic variance obtained in different environments were less consistent, and the estimates of genotype x environment interactions were higher for yield than for other important characters. The importance of genotype x environment interactions in reference to estimates of heritability and genetic advance are discussed." [Authors' summary]

- 792 VAN DER MEULEN, J. G. J.

Beproeving van soja op de kleigronden van de jonge kustvlakte. (Soya-bean trials on the clay soils of the new coastal plain).

Surinaam. Landb. 1955 : 3 : 249-67.

A wide range of introductions both from countries with tropical and with temperate climates were tested. The Indonesian variety Vada gave the best results in respect of yield of grain and green matter, size of grain, resistance to disease and general adaptability to the climatic and soil conditions of the coastal plain of Dutch Guiana. It is recommended for cultivation in this area as an alternative crop to rice.

- 793 **New Emerald pea.**

Seed World 1955 : 76 : No. 10 : p. 21.

Emerald, a market-garden type, is outstanding for its good quality and is suitable for growing in the southern USA. It is cold resistant and tolerant of high temperature, with dwarf habit. The peas are medium green, wrinkled and sweet.

- 794 PESOLA, V. A.

Försök med åkerväxter på avdelningen för växtförädling. (Field crop trials at the department of plant breeding). Tidskr. Lantm. Helsinki 1955 : 37 : 110-11.

Information is given concerning the frost resistance, time of maturity, yield and quality of pea varieties tested at Jokioinen, Finland, over the period 1944-53.

- 795 BRIAN, P. W., HEMMING, H. G.

The effect of gibberellic acid on shoot growth of pea seedlings.

Physiol. Plant. 1955 : 8 : 669-81.

Studies of the effect of solutions of gibberellic acid, a metabolic product of *Gibberella fujikuroi*, on the growth rate of 11 varieties of 14 day old pea seedlings are reported. Growth rate, height and weight of dwarf varieties were increased appreciably by applications of 0.01 μg . of gibberellic acid per plant to the leaves, higher doses producing no immediately greater increase in growth rate, although, in long-term experiments, a linear relationship was established between log dose and growth response in the dose range 0.01-0.32 μg . per plant. Slow-growing dwarf varieties such as Onward and Autocrat showed the greatest response to treatment; tall, fast-growing varieties such as Senator and Achievement were hardly affected. In a further series of experiments, solutions of indolylacetic acid were found to possess similar, although less pronounced, effects to those of gibberellic acid.

- 796 INOUE, Y. & SUZUKI, Y.

(Studies on flower bud differentiation, flowering and fruit setting in peas. II. On pollen fertility).

Engeigaku Dai Zasshi/J. hort. Ass. Japan 1955 : 23 : 221-24. [Japanese].

The germination percentage of the pollen of four Japanese varieties was examined under various experimental conditions. The pollen germinated best the day before anthesis; the optimum medium for germination was agar containing 20% sucrose.

- 797 BALASUBRAHMANYAM, R.

Inheritance of seed-coat colour in gram (*Cicer arietinum*).

Madras agric. J. 1950 : 37 : 379-84.

Crosses were made between six homozygous lines differing in colour of flower or testa with a view to studying the association and inheritance of these two characters. The inheritance of the flower colours pink, blue and white was found to be governed by three factors, viz. *C* and *B* which in combination produce blue flowers, and *P* which, when associated with *C* and *B*, results in pink flowers. In the absence of either *C* or *B* the flowers are white. The factor *A* imparts bluish-brown colour to the testa; *R*, in a dominant condition, modifies the effect of *A* by changing the bluish-brown colour of the testa to reddish-brown. *P*, in addition to influencing petal colour, intensifies the effect of *A* upon testa colour. Seed shape is attributed to the factors I^1 and I^2 , which also exercise a

modifying effect upon testa colour. The factor F^r affects the texture of the testa.

798 DEL VALLE, C. G. & HIDALGO GATO, E.
El maíz de rosita en Cuba. (**Popcorn in Cuba**).

Hacienda, NY 1955 : 50 : No. 7 : 48-49.

By crossing popcorns obtained from the USA

with Cuban varieties of field maize and selling the popcorn types that emerged, a good line of popcorn has been produced by the experimental station of Santiago de las Vegas in Cuba; it has a higher protein content and less fibre than the varieties from the USA and is better adapted to Cuban conditions.

BOOK REVIEWS

CRAMER, H.

The elements of probability theory and some of its applications.

John Wiley & Sons, New York and Chapman & Hall Ltd., London 1955 : 56s. : Pp. 281 : 29 figs. : tables.

The author is well known for his larger book, *Mathematical Methods of Statistics*, which is at a much higher mathematical level than the book under review. What is of value to the non-mathematical student is that a recognized authority with a gift for lucid exposition has written an elementary book on probability in which all the applications are to statistics. Part I, on Foundations, expounds clearly the rules of probability without appealing to abstruse ideas. In Part II, the theory is applied to random variables and probability distributions. Here the binomial, Poisson and normal distributions are described, and much of the usual syllabus in statistics is covered as well, for example, the χ^2 , t and F distributions, and regression and correlation. Part III consists of applications. This is of a more practical character, and includes the discussion of problems of statistical inference, a formal treatment of the χ^2 test, and observations on analysis of variance, sampling and statistical quality control. Examples are freely provided, and the book must be one of the best elementary manuals on statistics in existence. J. W.

MATHER, K.

Statistische Analysen in der Biologie. (**Statistical analysis in biology**).

Methuen & Co., London, and Springer-Verlag, Wien 1955 : 8th ed. : 17s. : Pp. 466 : 9 figs. : 61 tables. (Mimeographed).

The first edition of Prof. Mather's well-known introduction to statistics for biologists was reviewed in *PBA*, Vol. XIII, p. 272, the second edition, from which the third scarcely differs, in Vol. XVII, p. 234. The present translation into German, made by Professor A. Zeller, should assist in the wider dissemination of what

is generally regarded as one of the best of statistical text-books for readers with only limited mathematical equipment.

The translation follows the original text very closely. The translator has underlined key words and phrases in a number of cases, rather to the advantage of the reader. The glossary of terms at the back of the English edition is omitted and the index has been split up into separate indexes for the names of organisms and chemicals, for authors, and for subject matter.

The principal and rather serious drawback to the publication is the fact that it is rather indistinctly mimeographed from typescript and the mathematical formulae are inevitably too spread out to be readily assimilated.

GOLDSTEIN, P.

Genetics is easy.

Lantern Press, New York 1955 : 2nd ed. : \$4.00 : Pp. xv + 238 : 64 figs.

The first edition of this book appeared in 1947 (cf. *PBA*, Vol. XX, p. 362) as a slender volume of 70 pages in paper covers; the second edition is a full-sized book of 238 pages, complete with bibliography, index and a brown cloth binding. The illustrations have been made more elaborate but in the first two thirds of the book the text, though more elegant in typography and lay-out, remains unchanged, with quite minor additions or omissions here and there. One of the additions is a chapter entitled The three M's of heredity and the gene theory, in which the names Mendel, Morgan and Muller are extolled and the gene theory is briefly expounded. The section on blood groups has been enlarged to a separate chapter, dealing with their significance for blood transfusion and determinations of parentage. Other new chapters are devoted to defective metabolism in man, the inheritance of disease, hereditary phenomena associated with cancer, physiological genetics, the role of genes in chains of development, the genetics of micro-organisms, tests of hereditary traits, plant and animal breeding and human genetics. In his

concluding remarks about eugenics the author of this book on genetics rather surprisingly asserts that "many of the desirable human traits, such as character and personality, are completely environmental and have no relation whatsoever to heredity" and concludes that our present hope for making a better human race lies in providing the best possible environment for every individual.

DEMEREK, M. (Editor)

Advances in genetics. Volume VII.

Academic Books Ltd., London 1955 :

\$7.50 : Pp. ix + 309 : figs. : tables.

The first contribution to Volume VII of this valuable series (cf. *PBA*, Vol. XXV, p. 101), by V. Bryson and W. Szybalski, is devoted to Microbial drug resistance and comprises an extremely lucid and objective summing up of a vast body of knowledge on one of the most important and widely debated problems of modern biology. Various ways in which resistant populations may arise are analysed and suggestions are made for preventing this as far as possible during therapeutic treatment. It is recognized that selection will operate not only upon mutants but upon transient phenotypic differences in resistance. However, it is pointed out that the possibility of resistance arising by mutation has been convincingly demonstrated by combination analysis, which enables different genes for resistance to be located in different linkage groups.

In The origin and evolution of cultivated barley, R. Takahashi reviews the literature dealing with the wild relatives of cultivated barley, the centres of diversity and the diphyletic hypothesis of origin developed by Freisleben and by the author and his colleagues; some more recent information is considered in addition to his published work and leads to the tentative conclusion that the cultivation of wild six-rowed barleys of the *Hordeum agriocrithon* type started somewhere in eastern Asia, giving rise by mutation to cultivated forms with tough rachis (*bt₂*), which spread to various parts of the world and ultimately met and crossed with cultivated forms (*bt*) of *H. spontaneum* in southwestern Asia, thus giving rise to the present wide range of two and six-rowed cultivated barleys. A report is given of the author's studies of the present geographical distribution and hereditary constitution of certain primitive characters in cultivated barley such as coloured chaff and coloured grain, and of some desirable characters such as naked grain, glutinous endosperm, short, fine awns, absence of awns, winter habit and semibrachytic type. Although a fairly sharp

line of division can be drawn between the oriental and occidental groups of barley the members of the two groups are interfertile and there are signs that the intermixing that is made possible by modern conditions is already beginning to have its effect in levelling out the differences between the two groups.

Other contributions in this issue are devoted to problems of insect and animal genetics.

HADORN, E.

Letalfaktoren in ihrer Bedeutung für Erbpäthologie und Genphysiologie der Entwicklung. (**Lethal factors and their importance for hereditary pathology and for the gene physiology of development**).

Georg Thieme Verlag, Stuttgart 1955 :

DM 39 : Pp. 338 : 129 figs. : 27 tables.

The author states that objects from the vegetable kingdom have received but cursory treatment in his book, partly because he is a zoologist and partly because experimental developmental physiology in plants has in many respects lagged behind as compared with the animal kingdom. Be that as it may, no geneticist, whether he be working with objects from the vegetable or animal kingdom, or with human beings will wish to ignore this fine monograph, compiled by an acknowledged authority with the customary thoroughness of the German school and representing a standard of printing and production rarely found today outside western Germany and Switzerland. Starting with a section on definitions, the author next considers various technical problems such as methods of demonstrating lethal factors and maintaining strains containing them; the chapter on the origin of lethal factors by mutation includes an examination of their occurrence in wild populations, their production by various mutagenic agents and special dangers that may be associated with application of modern techniques, including the use of therapeutic radiations, atomic discharges and chemical compounds with mutagenic properties. Lethal effects caused by deficiencies and other chromosome aberrations are examined separately, since the author does not share the viewpoint that all lethal effects are conditioned by larger or smaller losses of chromosome material; nevertheless one of his categories of lethal factors is the group of submicroscopic alterations of the hereditary material, which, it is further stated, is in no way distinguishable from classical point or gene mutations! Further chapters are devoted to dominant lethal factors, polygenic lethality, cytoplasmic effects, penetrance, dominance and recessiveness, after

which special phenomena are considered such as effects specific for certain developmental phases or organs, pleiotropy, phenocopies, and biochemical abnormalities associated with lethal effects; the author himself has carried out some fascinating experiments in which mutants have been shown by paper chromatography to differ in content of a whole series of fluorescent substances, some of which are present in larger quantities in the mutant than in the wild type. Some of the results described in the book have not been published previously; these include chromatographic analyses showing clear differences between certain phenocopies and the original mutant, though the two are indistinguishable on eye examination. By these techniques many lethal effects are now being shown to be associated with an inability to build up the various aminoacids into protein molecules. A number of other lethal effects have been shown to be associated with reduced rates of various physiological processes such as respiration, or with alterations in hormone activity and in other physiological functions. The volume is completed by a glossary of special terms, a comprehensive bibliography and subject and author indexes.

SCHARFETTER, R.

Biographien von Pflanzensippen. (**Biographies of plant groups**).

Springer-Verlag, Wien 1953 : £3 4s. : Pp. xiii + 546 : 80 figs.

Combined studies of morphology, fossil distribution and present area and of ecology and phenology point to the conclusion that the genus *Taxus* arose as a tropical plant in the time before the separation of the American continent from Eurasia, and before the shift of the poles had led to the present temperate climate of Europe and North America. Similar arguments are presented for regarding most of the other coniferous species as relics from a tropical age. Short "biographies" on these lines are presented for each genus of the conifers and then for a number of the main angiospermous families. The second part of the book is devoted to general principles; in it the various alterations in growth pattern and physiology of development that have come about in the course of the ages are discussed. They have enabled the descendants of an originally tropical flora to adapt themselves to the greatest possible variety of present-day habitats. Among the many factors considered as having contributed to this increasing adaptation is chromosome duplication. A number of species that have arisen by autopolyploidy or allopolyploidy are cited, and

examples are given of polyploid species that have extended the area of adaptation of the genus to which they belong.

BOURNE, G. H. & DANIELLI, J. F. (Editors).

International review of cytology. Volume IV.

Academic Books Ltd., London 1955 : \$9.00 : Pp. 419 : figs. : tables.

The fourth volume of this series (cf. *PBA*, Vol. XXV, p. 444) again covers a wide field of interest. In Bacterial cytology, A. Marshak shows how the development of microbial genetics, with its concentration on genetic factors involved in the control of familiar biochemical systems, has prepared many minds for thinking in terms of nuclear phenomena in bacteria. The evidence for the existence of such bodies as centrioles, chromosomes and mitochondria is reviewed and the general conclusion is reached that there are sufficient points of resemblance between the chromosomes of higher organisms, the chromatinic bodies of ordinary bacteria, the principal components of the pleuro-pneumonia-like organisms, and the bacterial viruses, to conclude with reasonable assurance that they are analogous in structure and probably in function. Histochemistry of bacteria is treated by R. Vendrely, who among other things presents evidence that though the gram-positive reaction is associated with the presence of ribonucleates, it is also affected by the presence of other substances including lipids and polysaccharides and seems to be indicative more of a certain physicochemical state than of any specific chemical. An account is given of the various methods that have been used to demonstrate the existence in the bacteria of DNA and of an organelle possibly analogous with chromosomes or some form of loosely organized nucleus; knowledge concerning the enzymatic activities of bacteria is increasing and points to a certain similarity between some of the bacterial granules and the mitochondria of animals and higher plants. N. B. Kurnick reviews the Histochemistry of nucleic acids, pointing out several common sources of error in their determination; most of the modern staining methods are of doubtful value from the standpoint of quantitative determination. The advantages of various staining techniques such as the nuclear reaction and those based on methyl green, pyronin, fluorones, galloxyanin and many others are examined. Most of the physical methods, which are described, are open to objections too on the score of quantitative accuracy.

Other contributions in this issue include Structure and chemistry of nucleoli by W. S. Vincent, Cytochemical micrurgy by M. J. Kopac and Problems of fixation in cytology, histology and histochemistry by M. Wolman.

Fibrous proteins and their biological significance.

Symposia of the Society for Experimental Biology. No. 9. Cambridge University Press 1955 : 50s. : Pp. vi + 370 : figs. : tables : plates.

The Ninth Symposium of the Society for Experimental Biology was held at Leeds in September 1954. Like most of the earlier symposia, the present one, which is devoted to fibrous proteins, contains several contributions of interest to geneticists. Of these, two require special mention. The first is the paper by H. H. Weber on The link between metabolism and motility of cells and muscles. In this paper, experiments are described on cell "models" in which the membranes, soluble proteins and crystalloids of the cell are removed by extraction with water and glycerol, leaving behind a structure of insoluble fibrous proteins. In the case of the muscle-fibre models, contraction could be induced by the addition of ATP or ITP. It has also been discovered that cell models in anaphase can be made to stretch, not only by the addition of ATP, but also by adding inorganic pyrophosphate. The second paper is by D. Mazia on The organization of the mitotic apparatus. In this, experiments are reported on mitotic apparatus isolated from the containing cells by treatment with digitonin. The author and his colleagues were able to show that the mitotic apparatus consists largely of a single protein, mostly of cytoplasmic origin. It is thought that the spindle develops by gel formation in this protein brought about by inter-molecular S-S bonding. The spindle fibres are believed to be the manifestation of molecular aggregation and orientation caused by secondary bonding produced by agents diffusing out from the spindle poles and from the centromeres. Experiments on mitotic apparatus isolated from colchicine-treated cells showed that colchicine does not inhibit spindle formation but only the putative secondary bonding and differentiation into "fibres."

The other papers are of more general biological interest and are as follows. W. Astbury contributes a general introduction. This is followed by two biochemical papers, F. Sanger considering The Chemistry of simple proteins, and E. Chargaff, Deoxypentose nucleoproteins and their prosthetic groups.

Eight papers are devoted to collagen: K. M. Rudall, on The Distribution of collagen and chitin; A. Neuberger, Metabolism of collagen under normal conditions; D. Carlström *et al.*, The influence of collagen on the organization of apatite crystallites in bone; S. F. Jackson and R. H. Smith, Fibrogenesis of connective and skeletal tissues in the embryonic fowl; R. S. Bear, Configuration of collagen and gelatin molecules in condensed and dispersed states; P. M. Cowan *et al.*, Observations on native and precipitated collagen; and F. O. Schmitt, States of aggregation of collagen. A medical paper on Collagen diseases is contributed by J. H. Kellgren.

The biochemistry of the k-m-e-f proteins and the biochemical basis of muscle contraction are treated in the following five papers: J. B. Speakman, The Chemistry of keratinous structures; K. Bailey, The proteins of the myofibril; S. V. Perry, The components of the myofibril and their relation to its structure and function; J. Hanson and H. E. Huxley, The structural basis of contraction in striated muscle; and B. R. Malcolm, Some observations on the infrared spectrum of muscle.

The structure of flagella is the subject of two papers, W. T. Astbury *et al.* dealing with The structure of bacterial flagella, and J. R. G. Bradfield with Fibre patterns in animal flagella and cilia. Both papers consider reasons for the mysterious but almost universal occurrence of 11-strand flagella throughout the animal and plant kingdoms. J. R. G. Bradfield favours the rather desperate conclusion that the 11-strand condition arose fortuitously and has been perpetuated thereafter unchanged since its connexion with the basal centriole and centrosome system is too intimate to allow of mutation which might disrupt caryocinesis.

The final paper by J. G. Gall on Problems of structure and function in the amphibian oocyte nucleus provides evidence of RNA synthesis at the chromosome surface.

GREGG, J. R.

The language of taxonomy.

Columbia University Press, New York and Geoffrey Cumberlege, Oxford University Press 1954 : 20s. : Pp. ix + 70.

Symbolic logicians have long bewailed the fact that their elegant techniques have found little application outside the domain of symbolic logic itself. The only significant exceptions as far as biology is concerned are the publications of J. H. Woodger, whose *Axiomatic method in biology*, published as long ago as 1937, broke entirely new ground in seeking to translate

current biological ideas into symbolic logical notation. However, neither this nor Woodger's later papers have had much influence on other biologists, partly because of unfamiliarity on the part of biologists with modern logic, and partly because Woodger's treatment is analytic in tendency rather than providing a tool for new developments.

Professor Gregg's study of the language of taxonomy owes much to Woodger though differing fundamentally in his definition of taxonomic group or taxon. The first three chapters of his book are introductory and provide an explanation of the elements of set theory and the notions of ordered pairs and hierarchies for those unfamiliar with the subject. The chapter on hierarchies, as the author himself states, is based on Woodger's theory.

The author begins to grapple with taxonomy in chapter 4. A useful distinction is first made between three types of name: (1) proper names of individual organisms, (2) names of taxa; and (3) names of taxonomic categories such as *genus*. Later, a fourth category, names for sets of taxonomic categories, is added. The attribution of an organism to a species is expressed in the usual set-notation as $Socrates \in Homo sapiens$. The next step taken is suicidal. Lower taxonomic categories are taken to be subsets of the higher categories so that, for instance $Homo sapiens \subset Homo \subset Hominidae \subset \dots Primates$; the author is thereby enabled to make such statements as $Socrates \in Homo$ and $Socrates \in Primate$. The outcome is that on p. 61 the author runs into difficulties in trying to establish correspondences between partitioning levels of a taxon and the standard taxonomic categories in such groupings as

genus $\begin{cases} \text{species} \\ \text{subgenus—species.} \end{cases}$

Worse still, by admitting such expressions as $Socrates \in Homo$ in the case of monotypic taxa, the author is forced to conclude on p. 66 that no taxonomic category is necessarily mutually exclusive of any other, and we are presented with such biologically inadmissible statements as *Homo sapiens is a genus* and *Homo is a species*. The author remarks, with regard to these conclusions, that there may be "some taxonomists who will deny that they are true, but it is not clearly evident (to say the least) that they can be escaped." It is fair to reply that the knot into which the author has tied himself is not the responsibility of the taxonomist but is a consequence of the particular way in which set theory has been applied. If lower taxonomic categories are regarded as elements of the set

constituted by the next higher category rather than as subsets of it, the logical difficulties created by the author appear to be resolvable. One other minor point. On p. 61 the author states that he knows of no exception to the rule that the subtaxa of a taxon are all of the same taxonomic category, e.g. all the subtaxa of a particular genus are species or are all some other category. It is possible here that the seeming uniformity of taxonomic nomenclature is providing a snare for the logician. W. H. Camp and C. L. Gilley have already suggested that the *species* is an aggregate name covering twelve distinct categories (cf. *PBA*, Vol. XIV, Abst. 789), and it is quite likely that the time slice provided by two species and their fertile amphidiploid derivative might well afford an instance where the units into which a genus is partitioned are of very different natures.

Professor Gregg's study is very much a pioneering effort, and irrespective of criticisms that can be made as to details, deserves due consideration from anyone interested in taxonomic theory or in the axiomatization of biology. It seems however that logicians should be wary how they apply standard set-theoretical procedures to biology since organisms are by no means so tractable to their methods as algebraic elements.

In conclusion, may one request that any future author on logic and biology will follow the example of Woodger and tabulate his logical functions at the beginning or end of the publication. There is no sort of uniformity of nomenclature in this field at the moment, and it is most desirable that readers' memories should be easily refreshable as to the significance of the numerous symbols involved.

BORDZILOVSKIĬ, E. I. (Editor).
(*Flora of the Ukrainian SSR*).

Akad. Nauk. URSR, Kiiv 1938 : figs. :
plates : maps. [Ukrainian].

The first volume of the second edition of the flora of the Ukraine, which appeared in 1938, was devoted to the Pteridophyta and Gymnospermae. Later volumes, which have been issued from time to time, are devoted to the angiospermous flora, the families being treated in the order of Engler's system of classification. Volume VI, the last to be received, deals with the Rosaceae and Leguminosae.

NORMAN, A. G. (Editor)
Advances in agronomy. Volume VII.
Academic Press Inc., New York 1955 :
Pp. xi + 431 : figs. : tables.

Again a number of the contributions (cf. *PBA*,

Vol. XXV, p. 267) refer directly or indirectly to plant breeding and its achievements; in *Improvement of the sugar beet in the United States*, G. H. Coons, F. V. Owen and D. Stewart give an historical account of the origin of the sugar beet not only in America but from the early work of Marggraf and Achard in Europe up to the present time. The early difficulties in developing a sugar beet industry in the USA are attributed largely to reliance on imported seed and to epidemics of diseases such as leaf spot and curly top, to which the imported varieties were susceptible. Serious efforts to breed resistant varieties were started in 1925 and the present account describes the production of curly-top resisters and heterotic hybrids resistant to leaf spot; strains with combined resistance to downy mildew, rust, curly top and bolting which have been the salvation of sugar-beet growing in southern and central California; and synthetic hybrids with combined resistance to black root and leaf spot. Breeding methods employed have included the polycross method originally devised for lucerne breeding, the use of marker characters such as red hypocotyl, the application of various types of male sterility in the production of hybrids showing heterosis and of monogerm male-sterile types for the introduction of the monogerm character into commercial sugar beets. Reaction to photothermal induction, leading to bolting, has been shown to be dependent on two genes *B* and *B'*. Certain wild forms of *Beta maritima* have revealed resistance to leaf spot and curly top and special efforts are being made to use *B. patellaris*, *B. procumbens* and *B. webbiana* in crossing on account of their immunity to *Cercospora beticola* and nematode, combined with a high degree of resistance to curly top; considerable advances in sugar-beet breeding are envisaged from the use of inbred lines, monogerm seed, polyploidy and other modern genetical techniques.

E. Åberg, in *Recent changes in Swedish crop production*, gives a vivid description of the varied agricultural conditions in Sweden as a background to the work of the plant breeder in producing varieties adapted to a wide range of climatic conditions, mostly unfavourable for crop growth in one respect or another. The success with which the Swedish breeders have met this challenge is seen by this account of the production of winter wheats superior in yielding ability, winter hardiness and baking quality, spring wheats of superior earliness and quality, suitable for combining, improved rye varieties including the tetraploid Dubbelstål [Double Steel], stiff-strawed two-rowed barleys

suitable for combining, extremely early six-rowed barleys, many famous white, yellow and black oat varieties, clovers resistant to stem rot and nematodes and tetraploids of Alsike and other clovers; the issue of a recommended list of some 25 potato varieties has effected great improvements in potato growing; other improvements include forage beets with 15–20% dry matter content, peas with high phytin content and hence better cooking quality, varieties of rape and turnip rape suitable for autumn sowing and sugar beets that have put this plant into the ranks of the major crop plants of Swedish agriculture.

W. H. Hodge and C. O. Erlanson, in *Plant introduction as a federal service to agriculture*, tell of the early efforts of various individuals and public bodies concerned with plant introduction into the United States, the Washington navel orange, the oriental persimmon and the soya bean being quoted among the successful introductions. The present activities of the Section of Plant Introduction at Beltsville, Md., and of the four Plant Introduction Gardens operated by it, are outlined. Among the achievements mentioned are the publication of reports on the testing of a large series of tomato introductions for resistance to a number of well-known diseases; the cooperative testing of large numbers of sweet potato introductions from the Antilles; and a large number of successful wheats introduced from abroad, in addition to Trebi barley from Turkey and Club Mariout from Egypt, *Agropyron cristatum* from Siberia, Korean lespedeza, Acala cotton from Mexico and various wild *Solanum* species possessed of valuable resistance genes, together with a host of others. Other contributions in this issue deal with green manuring, soil nitrogen balance sheets, weed control, soil microbiology and other aspects of soil science.

COMAR, C. L.

Radioisotopes in biology and agriculture.

McGraw-Hill Publishing Co. Ltd., London 1955 : 67s. 6d. : Pp. ix + 481 : figs. : tables.

The chief purpose of this volume is to give investigators of biological and agricultural problems an understanding of how radioisotopes may aid them in their research and also sufficient information for the undertaking of actual experiments. Throughout, the use of mathematics and physics has been reduced to the minimum. Chapter 1 deals with certain basic principles, illustrated by examples drawn from such diverse fields as physiology, nutrition,

entomology and soil science. The section on kinetics may be difficult for the reader with little background in mathematics but an understanding of logarithms will enable him to use the methods. Chapter 2 considers certain difficulties inherent in tracer studies and shows how they may be avoided or taken into account in the interpretations. Chapter 3 provides information on precautionary health measures. The next two chapters describe the facilities required and procedures suitable for studies with plants and animals. Chapter 6 presents in summary form a description of each radioisotope so as make possible decisions concerning counting methods, facilities required and amounts of radioactivity to be employed. Chapters 7 to 10 are devoted to the principles and application of corollary techniques, viz. autoradiography, paper chromatography, ion-exchange separation methods and radioactivation analysis. Those mainly interested in genetics will be disappointed to find only a brief account of the application of the autoradiographic technique for the analysis of nuclear biosynthesis and no reference to the use of P^{32} in elucidating the nature of the genetic material of bacteriophages and the relationship between these organisms and their hosts. But as a much-needed general introduction to tracer studies this practical text book can be thoroughly recommended.

BLANCK, F. C. (Editor)

Handbook of food and agriculture.

Reinhold Publishing Corporation, New York, and Chapman & Hall Ltd., London 1955 : 100s. : Pp. vii + 1039 : tables : figs.

Primarily intended for use by workers in the United States, this handbook is chiefly concerned with food technology, the relatively few agricultural topics chosen having a basically chemical or biochemical context and thus linking up with the technological fields. As emphasized by the editor in his preface, it is obviously impossible to present adequate information on all aspects of agriculture and food production, and discussions of many important subjects such as horticulture, agricultural engineering, plant pathology, genetics, plant and animal breeding or climatology have perforce been excluded. The first chapter, by E. Winters, provides a general introduction to the properties of soils. It is followed by three further chapters on soils: Soil fertility by C. L. W. Swanson, Soil microbiology by C. Thom and Fertilizers by A. L. Mehring. In the next couple of chapters the role of chemical control

in modern agricultural practice is described: C. C. Roan writes on Insecticides, fungicides and herbicides and L. P. Miller on Growth regulants, their nature and action. The remaining twenty contributions are devoted to agricultural products and relevant technological subjects: Enzymes, C. V. Smythe; Oxidative rancidity and antioxidants, R. W. Riemenschneider; The essential nutrients, D. M. Hegsted; Storage of agricultural raw products, W. T. Pentzer; Food preservation, C. R. Fellers; Effect of canning and dehydration on the nutritive value of foods, L. E. Clifcorn and G. T. Peterson; Food spoilage and deterioration, H. E. Goresline; Cereals and cereal products, C. G. Harrel and D. M. Dirks; Dairy products, B. H. Webb; Vegetable fats and oils, E. W. Eckey; Sea foods, H. L. A. Tarr; Animal products, H. R. Kraybill; The chemistry of plants, L. B. Rockland; Poultry products, H. Lineweaver and A. A. Klose; Food engineering, J. H. Nair; Food packaging, C. O. Ball; Food quality and quality control, A. Kramer; Disposal of food plant wastes, N. H. Sanborn; Chemicals in foods, C. N. Frey; and The Federal Food, Drug, and Cosmetic Act, P. B. Dunbar. Each chapter contains a bibliography for further reference. The appendix provides information on various food laws, official nutritional standards, special food agencies, research groups and the literature on food research and technology, all with reference solely or chiefly to the USA. Compiled by foremost experts, this handbook will be found highly useful as an up-to-date guide to American advances in food technology in connexion with agriculture.

ARNOLD, A.

Die Bedeutung der Chlorionen für die Pflanze. (The importance of chloride ions for the plant).

Gustav Fischer Verlag, Jena 1955 : DM 10.70 : Pp. viii + 148 : 24 figs. : 43 tables.

In his studies of the problems of salt tolerance the author has observed that halophytes are able to withstand large concentrations of chloride ions and the question naturally arose as to whether the typical responses of plants to saline conditions are connected with the salt itself or with the increased concentration of chloride ions. The resulting monograph on the chloride ions and their physiological action on plants will therefore be of interest not only to physiologists but to any plant breeder who is attempting to produce salt-tolerant varieties. It gives a rather comprehensive picture of what is known on the subject of the absorption of chloride ions by the plant, their storage,

influence on the metabolism of ordinary plants and of halophytes, and their influence on transpiration, drought resistance, seed production and fruit formation. Succulence and the morphological changes that plants undergo under the influence of high salt concentration are examined and consideration is given to the degree of tolerance and susceptibility of different groups of plants. It is concluded that as far as Cl^- ions are concerned there is no upper or lower limit of tolerance and any plant can absorb and retain large amounts of chlorine provided the other factors such as pH and concentration of salts in the nutritive medium are suitable; the optimum conditions in this respect vary widely for different plants. Many effects that have been attributed to Cl^- deficiency are really, it is thought, due to deficiency in some trace element, or to unsuitable salt concentration, and none of the cases of damage from excess Cl^- reported in the literature is found to provide convincing evidence that the effects were due to the chloride ions themselves and not to some associated factors such as salinity or deficiency in the anions of nutritive salts.

OGINSKY, E. L. & UMBREIT, W. W.

An introduction to bacterial physiology.

W. H. Freeman and Company, San Francisco, and Bailey Bros. & Swinfen, Ltd., London 1954 : \$6.00 or 51s. : Pp. xi + 404 : figs. : tables.

On first glancing through this book, the reader's eye is caught by the striking illustrations. These include a number of good electron micrographs, but more conspicuous are the decorative designs at the head of each section and the curious drawings dispersed throughout the book, some representing various metabolic processes as clockwork mechanisms of cogwheels, one depicting a little river of arginine synthesis being dammed at a number of points by genetic blocks and another, illustrating the progress of a particle as it hurtles through an orderly universe of large and small spheres (outer layers of the bacterial capsule), then through clouds (capsule jelly) and finally bounces against the cushiony membrane lying immediately behind the grid of massive girders forming the cell wall. From these science-fiction illustrations one turns with some misgiving to the text. Here, however, all is well; a large bulk of material has been sifted and selected and is well and clearly presented in a style which, although at times unnecessarily colloquial, has the merit of being readable. The book is divided into six sections. The first is a short introductory chapter on the

nature of bacterial physiology; the second deals with cytology; the third, a lengthy section on the growth and nutrition of populations and their behaviour under different environmental conditions, includes a chapter on genetics; the fourth and longest section is concerned with respiration and the metabolism of carbohydrates, aminoacids and other compounds; the behaviour of autotrophs, viruses and rickettsiae is described in section five; and problems of adaptation, resistance and virulence are considered in the final section. The book is intended for the use of undergraduates who already have some knowledge of general bacteriology; it can, however, be recommended to any biology student requiring a lucid introduction to the rapidly growing field of bacterial physiology. A list of references is provided at the end of each chapter, together with a set of questions intended to stimulate the reader to seek further information from other sources.

KAPPERT, H. & RUDORF, W. (Editors)
Handbuch der Pflanzenzüchtung.
(**Manual of plant breeding**).

Paul Parey, Berlin & Hamburg 1955 :
2nd Ed. : Lief. 2 : Vol. 1 : Bogen 6-10 :
81-160 : figs. : tables : DM 13.50.

The second instalment of this manual (cf. *PBA*, Vol. XXV, p. 635) completes the section on Reproduction and inheritance, which is followed by an essay by H. Kappert on Die Vererbung [Inheritance], in which special attention is given to aspects that are of importance to the breeder, such as the inheritance of quantitative characters and the mutants in *Neurospora* which provide a close link between the genetical and chemical factors leading to the expression of given characters. The next section, Chromosom, Chromosomensatz, Polyploidie [The chromosome, chromosome complement, polyploidy] is by J. Straub and is followed by the first part of Plasma-Vererbung [Cytoplasmic inheritance] by P. Michaelis.

Vorträge aus den Gebieten Acker- und Pflanzenbau, Bodenkunde und Pflanzenzüchtung. (**Lectures in the spheres of arable farming, crop cultivation, soil science and plant breeding**).

Deutscher Verlag der Wissenschaften:
Berlin 1954 : DM 5.60 : Pp. 109 : figs. :
tables.

This publication comprises a series of lectures delivered in September 1953 at a meeting held to commemorate the 25th Anniversary of the founding of the Müncheberg Agricultural Institute, Eastern Germany. E. Rübensam opened the proceedings with an account of the growth

of the institute since its inception by Erwin Baur and described current research work there. Priority is being given to questions of soil fertility and to the breeding of new varieties of stone and pome fruits, root and leguminous crops and forage grasses. M. Schmidt followed with an eulogy on Erwin Baur, whose early writings are interpreted as showing him to be a practical geneticist of the first order and the pioneer of modern methods of grape and fruit-tree breeding in Germany. His outstanding achievements are said to include the development of a large number of new high-yielding, frost-resistant fruit varieties. O. Schröck described advances made in the science of forest-tree genetics over the last four decades, with special reference to research carried out in the USA, Russia and Sweden. He stressed that work in this field is still in its initial stages and that much requires to be done before forest-tree breeding achieves results comparable with those obtained in crop plant breeding. H.-J. Troll dealt with the history of the cultivation of the lupin from classical times to the development of the sweet lupin. K. Zimmermann spoke on the problems and aims of grass breeding and claimed that insufficient attention had been paid in the past to improving the yields of forage grasses, with the result that many pedigree strains gave yields no higher than those of the wild forms from which they had been derived. Among the breeding methods he advocated were mass and pedigree selection, the exploitation of hybrid vigour, the polycross technique and the artificial induction of mutations. Results obtained at Müncheberg in breeding new high-yielding strains of forage grasses are mentioned (cf. *PBA*, Vol. XXIV, Abst. 3023). Other papers read at the meeting included The lay-out of crop rotation experiments by W. Simon, The mutual relationship between number of soil microorganisms and environmental factors in 24 species of forage plants by G. Müller and A contribution to the study of soil friability by A. Kullmann. In conclusion, H. Dubschlaff gave a talk on cooperation between research worker and farmer and the application of the results of scientific research to practical farming.

GREBENŠČIKOV, I.

Mais als Kulturpflanze. (**Maize as a crop plant**).

Die neue Brehm-Bücherei, Wittenberg 1954 : Pp. 76 : 58 figs.

This attractively produced booklet is claimed by its author to be the first comprehensive work on maize to be published in the German tongue.

Written principally for the layman, it makes easy reading and includes much information of general interest. The introduction deals with the economic value of maize as a cereal, for silage purposes and as a green fodder crop and discusses the industrial uses to which some of its extracts, such as starch, may be put. There follows an account of the relationship between maize, *Tripsacum dactyloides*, *Euchlaena mexicana* and the other members of the tribe Maydeae. The morphological characteristics and growth habit of maize are then outlined and amply illustrated by a number of photographs and diagrams. The following section is devoted to the systematics of *Zea mays*; each convariety is described in detail and information given on the parts of the world in which it is grown. The problem of where in the New World maize originated is then discussed and it is concluded, on the basis of recent archeological discoveries and the dating of prehistoric remains by means of isotopes, that Mexico and not Peru is the centre of origin of cultivated maize. The next chapter, on the importance of maize to the Aztec and Inca civilisations and the mythology and rituals built up around this plant, is possibly the most fascinating part of the entire book. Of special interest is the author's theory that an extremely effective form of selection was carried out by the best cobs being offered to the maize goddess and the grain from them subsequently used as seed. The feast of rejuvenation, celebrated every eighth year, may have also played a role in breeding, as it is thought probable that new seed stock was introduced on these occasions, with the result that the danger of yield losses due to inbreeding would have been reduced. This section closes with translations of excerpts from Mexican folklore on how the Indians came to obtain maize. The author then deals in some detail with the rapid spread of maize to Europe, Asia and Africa after the discovery of the New World and gives statistics on the amount of maize grown in different countries. The final chapter is devoted to the agronomic aspect of maize cultivation, with special reference to the insect pests and diseases to which it is susceptible.

As will be gathered from a perusal of the above, the author has succeeded in his aim of presenting an interesting, topical account of the maize plant and its cultivation. A somewhat curious feature, however, is the almost complete lack of information on hybrid maize, to which only the final paragraph of the book has been devoted, thus resulting in the whole publication having a

somewhat out-of-date appearance. The tirade on p. 39-40, informing us that American capitalists have stolen the Mexicans' birth-right—maize—and, by flooding the country with their own cheap and nutritionally inferior product, compelled many Mexican peasants to give up their land and work in American concerns in Mexico, would appear questionable both from the point of view of accuracy and relevance to a scientific study of this kind and tends to mar the otherwise pleasing impression that the reader gains from its perusal.

GOODSPEED, T. H.

The genus *Nicotiana*.

Chronica Botanica Co., Waltham, Mass.,
USA 1954 : 16 : No. 1/6 : \$12.50 : Pp. xxi
+ 536 : 118 figs.

Some of the most valuable contributions to biology in recent years, and not to biology alone, have been combined taxonomic and cytogenetical investigations of single genera. The study of *Gossypium* by J. B. Hutchinson, R. A. Silow and S. G. Stephens, the main results of which were published in "The evolution of *Gossypium*" (cf. *PBA*, Vol. XVIII, p. 183), is a case in point. *Nicotiana* is another genus which has been the subject of comparable detailed taxonomic and cytological investigation, in particular at the University of California where work on the genus was begun by the late W. A. Satchell in 1904 and continued especially by the present author and R. E. Clausen. Summaries of a long series of papers on the genus by the last two authors appear in past issues of *Plant Breeding Abstracts*.

The present volume integrates the results published hitherto and includes much new material. The first part deals with the geographical distribution of the species and the interpretation of this in terms of geological history. The second part is a review of the range in morphology encountered in the genus; one of the most important chapters in this part is Chapter 7 in which the significance of trichome variation is discussed. In part III, the cytology of the species is described, with the principal emphasis on chromosome numbers and karyotype analysis. Part IV is perhaps the most important of all since it deals with the cytology of over 200 interspecific hybrids, representing all the major types encountered in the genus. It is principally on the basis of the metaphase configurations encountered in these hybrids, together with the morphological and geographical data already dealt with, that the author proceeds, in part V, to put forward his views on the evolutionary history of the genus.

Part VI, written in collaboration with H.-M. Wheeler and P. C. Hutchison, is a monographic taxonomic description of all the *Nicotiana* species recognized, most of which are figured.

It is hardly necessary to state that this work is an essential source of information for all students of the genus. It is also one of the most important treatises on plant evolution that have yet appeared and is therefore of general botanical interest.

It is not possible, with so huge a corpus of information, to comment systematically on the text. It would be fair to state, however, that the general outline of Prof. Goodspeed's reconstruction of the evolutionary history of *Nicotiana* appears well-substantiated. It is possible to feel some uneasiness about the use of such terms as *pregeneric reservoir*, but it is probable that no implication is intended that does not accord with current neo-Darwinian concepts.

Some disappointment is occasioned by the traditionalist treatment of taxonomy in part VI. Had the cytological data in parts III and IV been incorporated, even if only in summary form, in this section, then an extremely valuable taxonomic account would have resulted. As it is, the copious morphological data are counterbalanced by no more than a mention of the chromosome number and a short comment, often the most illuminating section of the specific description, on affinities. The impression is therefore created that taxonomy is primarily concerned with external morphology, an unbalanced point of view that the earlier part of the book had done much to dispel. Also, the species concept employed does not appear to have benefited much from the genetical atmosphere in which it finds itself. Thus we find assemblages of vicariant populations such as *N. repanda*, *N. stocktonii* and *N. nesophila*, or *N. trigonophylla* and *N. palmeri*, in each of which the intragroup hybrids show complete or nearly complete chromosome pairing, in which nevertheless, the component vicariants are regarded as specifically distinct. It is obvious that such species are not in the same genetical category as such well-marked species as *N. thyrsoiflora*.

A word of appreciation is due to the illustrators whose work contributes greatly to the value of the taxonomic treatment in part VI.

MARSHALL, R.

**Cherries and cherry products.
Economic crops. Volume V.**

Interscience Publishers, Inc., New York
1954 : \$8.50 : Pp. xiv + 283 : 41 figs. :
27 tables.

This book covers a rather wider field than might

be expected of "one of a series of monographs on the chemistry, physiology and technology of food and food products": of the seventeen chapters, none of the first seven is concerned with any of these subjects. The first chapter rapidly surveys the history of cherry cultivation, the next gives some figures for production in the USA, Canada and the other main producing countries and the third describes the more important species and varieties. The fourth chapter, on the anatomy and histological development of the fruit, is marred by its confused descriptions, misuse of botanical terms and an incorrectly labelled diagram on page 42. The effects of environmental factors on tree growth, methods of orchard management and the control of pests and diseases are dealt with in the next three chapters, purposely brief since these aspects of cherry production are adequately described in other works. The most generally useful section of the book is contained in the next nine chapters in which are described in some detail the chemical and physiological changes taking place before and after maturity, the handling of ripe fruit, methods of transportation, techniques of preservation by canning, freezing and brining and the production of cherry juice and dehydrated cherries. The final chapter gives a summary of the standards and grades for fresh and processed cherries adopted by federal and state agencies in the USA. Dr. Marshall, in fulfilling his intention to "assemble a digest of the existing data and literature pertaining the cherry industry in North America," has produced a work which will undoubtedly be of considerable value and interest to workers in both his own and other countries. A list of references is provided for each chapter and the book concludes with an author and a subject index.

MORGENTHAU, J.

Die Nadelgehölze. (**The conifers**).

Gustav Fischer Verlag, Stuttgart, 1955 : 3rd ed. : DM 26.80 : Pp. x + 337 : 456 figs. : tables.

The first edition of this excellent handbook was published in 1950 and the fact that a third edition has now been issued is an indication of the useful purpose that the publication has fulfilled.

The book is a concisely-written flora of the wild and introduced conifers occurring in Germany, the latter category including both economic species and forms found in parks and gardens. For each species data are provided on synonymy, habit, the morphology of the bark, foliage and

cones, the world distribution, the climatic conditions of the natural habitat as classified by C. A. Schenk, and the adaptability and usefulness of the species under German conditions. Brief notes are also added on the principal cultivated varieties of the species described.

One of the most valuable features of the book is the wealth of beautifully-produced illustrations. For most species half-tone photographs of the entire tree, the foliage and the bark are provided. In addition, line drawings of the cones and the cross-sectional appearance of the leaves are also given.

Keys are provided to the genera and species, and tables are given at the end of the book on the mean temperatures and precipitation corresponding to each of C. A. Schenk's climatic zones. This book reflects much credit on both author and publisher and should prove of value in other countries whose climatic conditions approach those of Germany.

Woordenlijst voor de tuinbouw in 7 talen. (**Horticultural dictionary in 7 languages**).

Directie van de Landbouw, 's-Gravenhage 1955 : f 3.50 : Pp. 394.

Practical horticulturalists and all horticultural research workers who are required to read articles in a foreign language will welcome this multilingual dictionary, perhaps one of the most ambitious works of its kind ever to have been undertaken. A wide range of horticultural and agricultural terms—over 3000 in all—has been assembled and the author has obviously devoted much painstaking care to its compilation. It is no simple task to render highly-specialized terms into six different foreign languages, even with the assistance of foreign authorities on the subject, and some mistakes are bound to occur. In spite of these mistakes, however, the dictionary should prove of considerable value, provided that it is used with a slight degree of caution. The lay-out is excellent, facilitating easy reference from one language to another. The words are arranged according to their alphabetical order in Dutch and, to find the translation of an English, French, German, Danish, Swedish or Spanish word, reference is made to the relevant register at the end of the book. In these registers, of which there is one for each language, each word is followed by an indication of where it is to be found in the main body of the dictionary.

The principal criticisms that can be made of this work fall into three main categories. Firstly, a number of words have been either

mistranslated or translated by an uncommon word when a more usual term would have been better. Thus *beurs* in Dutch is *overripe* in English and not *blotted*; *bevruchting* should be translated by *fertilization* and not by *fecundation*; and *afrikaan* (*Tagetes*) is not what is normally called a *marigold*. Neither the English word *bastard* nor the French *métis* is used in the sense of a plant hybrid. *Züchten* rather than *veredeln* is the more usual German expression for *to breed*. The Dutch word *marmelade* is *jam* not *marmalade* in English. The colour *rose* in Dutch should have been translated by *pink* in English. The expression *maiden seed* is not current in English. The German for *Jerusalem artichoke* is more often *Topinambur* than *Aardbirne*. The translation of the English word *rose* by *pomme* in French is likely to give rise to misunderstandings if it is not made clear that it is the rose of a watering-can that is meant. There is a tendency to translate verbs in the other languages by nouns in Danish, for example *to adsorb* as *adsorption*. A peculiar omission is the author's failure to give a German equivalent for *broad bean*. The second criticism concerns the genders of Danish and Swedish nouns. Most, but by no means all, Danish nouns are given with their gender; in no case, however, is

the gender of a Swedish noun indicated. Thirdly, the placing of the accents on Spanish words is occasionally faulty. Thus *inspeccion* should read *inspección* and *peciolo* should be *pecíolo*.

The general impression gained is that this dictionary, although in many ways an excellent and bravely attempted work, is marred by a not inconsiderable number of mistakes. It is to be hoped that these will be corrected in future editions.

NEW JOURNAL

The Andhra Agricultural Journal

This journal, the official organ of the newly-formed Andhra Agricultural Union, is to be published six times a year. The first issue, which appeared in January 1954, contains short contributions by the officers of the union on the activities of the Agricultural College, Bapatla, and its research stations; later numbers are to include research notes and abstracts from other journals as well as papers of general interest on agriculture and related topics. Further information may be obtained from the Secretary, Andhra Agricultural Union, Agricultural College, Bapatla, Guntur Dt., Andhra, India.

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